University of Alberta

DRAWING TO LEARN

©

By

Margaret Brooks

A Thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Department of Elementary Education and the Department of Art and Design

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ABSTRACT

This Visual Ethnographic study examined the ways children in my Grade 1 class used drawing in the context of their learning. It brought together my professional discipline of Early Childhood and my commitment as an artist. A Vygotskian, social constructionist perspective was used to guide both my data collection and my analysis of the data. The visual data for this study is presented on an accompanying CD.

A graphic symbol system provides children with their first means of making a permanent, tangible, concrete, and communicable record of their ideas so that most young children have a strong desire to draw. The children in this study productively used drawing in many different contexts to make sense of the world in which they live. The children were encouraged to talk about, share, revise and revisit their drawings. These drawing processes extended the children's thinking, their awareness of different possibilities for representation and their drawing repertoire. Drawing allowed time for thoughtful responses to experiences by engaging children with the subject in meaningful ways for longer periods. Drawing seemed to mediate between thought and action to support progressively complex ideas.

TABLE OF CONTENTS

Chapter One 1
Introduction and Background 1
Reading The Study 2
Background To The Study 2
The Setting For The Study 7
Young Children and Drawing: A Review of The Literature 8
Reflections on My Studio Experience 26
The Beginning 33
The Artists Model (October 1997) 34
Moving Out of the Studio and Entering Another's Space (October 1998) 42
Cristina Sewing 47
One Stitch 50
From the Inside 51
The Knot 53
Mending 1 and 2, and Listening 54
Transformation 59

Chapter Two 62
Context For The Study 62
Philosophy 62
Program Dimensions 65
Space 68
Topic Web 70

Chapter Three 71
Methodologies 71
Selecting a Method: Justifying a More Visual Approach 71
Ethnography 73
Visual Ethnography 74
Images 76
Video 82
Using the Video Camera in the Classroom 92
Deciding what to Videotape 98
Deciding how to Edit 100
Hypermedia 102
A Vygotskian Social Constructionist Perspective 109
The Social Context 116
Drawing The Growth and Development of Painted Lady Butterflies 119
Background and Setting 119
Jenn's First Drawing 122
Jenn's Second Drawing (the Fat Caterpillar) 125
Jenn's Third Drawing 127
Jenn's Fourth and Fifth Pictures 131

Jenn's Review and Reconstruction of Her Drawings 133
Language and Thought 135
The Zone of Proximal Development (ZPD) 143

Chapter Four 161
Presentation and Analysis of the Data 161
Introduction to Analyses 161
Analysis of Ed's Flashlight Project 161
Examining Flashlights, Screen 1 161
Ed's Flashlight Drawing Process, Screen 1 166
Ed's Flashlight Drawing Process, Screen 2 167
Ed's Flashlight Drawing Process, Screen 3 167
Analysis of Light Traps Section 170
Ed's Light Traps 170
Screen 1 170
Screens 4 and 5 171
Mirrors 174
Ed's Exploration of Mirrors, Screens 1, 2, and 3 174
Ed's Exploration of Mirrors, Screen 4 175
Stuart and Anton's Light Trap 176
Stuart and Anton's Light Trap, Screens 1 and 2 176
Stuart and Anton's Light Trap, Screen 3 177
Dean's Light Trap 178
Dean's Light Trap, Screens 1 - 4 178
Gordon's Light Trap 180
Gordon's Light Trap, Screen 1 180
Gordon's Light Trap, Screen 2 180
Gordon's Light Trap, Screen 3 181
Gordon's Light Trap, Screens 4 and 5 181
Gordon and Mark's Light Trap 181
Gordon and Mark's Light Trap, Screen 1 181
Gordon and Mark's Light Trap, Screen 3 182
Ryan's Light Trap 183
Ryan's Light Trap, Screens 1 and 2 183
Rick and Simon's Pinhole Pictures 186
Rick and Simon's Pinhole Pictures, Screens 1 and 2 186
Rick and Simon's Pinhole Picture Show, Screen 3 187
Rick and Simon's Pinhole Picture Show, Screen 4 187
Analysis of Shadows Section 188
Ed's Shadow Theory 188
Outside Shadows 189
Outside Shadows, Screens 1 and 2 189
Outside Shadows, Screens 3 and 4 192
Outside Shadows, Screens 5, 6, and 7 193
Inside Shadows 194

Inside Shadows, Screen 1 194
Inside Shadows, Screen 2 196
Inside Shadows, Screen 3 196
Inside Shadows (Wooden Figures), Screen 1 198
Inside Shadows (Wooden Figures), Screens 2 and 3 199
Inside Shadows (Wooden Figures), Screen 4 202
Inside Shadows (Wooden Figures), Screens 7, 8, 9, 10, and 11 202
Inside Shadows (Wooden Figures), Screens 5 and 6 203
Analysis of the Cameras Section 204
Introduction to Cameras, Screen 1 204
Introduction to Cameras, Screen 2 205
Introduction to Cameras, Screen 5 206
Introduction to Cameras, Screens 3 and 4 207
Drawing and Experimenting with Cameras 208
Drawing and Experimenting with Cameras, Screen 1 208
Drawing and Experimenting with Cameras, Screens 3, 4, 5, and 6 208
Drawing and Experimenting with Cameras, Screens 8 and 9 210
Drawing and Experimenting with Cameras, Screen 10 211
Other Examples of Children Drawing Cameras 211
Taking Photographs 211
Taking Photographs, Screen 1 211
Taking Photographs, Screen 2 212
Taking Photographs, Screens 3, 4, and 5 213
Making Moving Pictures 214
Making Moving Pictures, Screens 1, 2, and 3 214
Building Their Own Photography Studio 217
Building Their Own Photography Studio, Screens 1-11 218

Chapter Five 221
Conclusions and Recommendations 221
1. What Does a Vygotskian, Social Constructionist Perspective of Drawing Reveal? 221
Immediate Interactive Level 222
Interpersonal Level 223
Intrapersonal Level 225
Structural Level 230
General Cultural and Social Level 232
2. What Is The Relationship Between Thought and Drawing? 234
3. Can Drawing Be an Activity That Leads Development? 239
4. How Can Drawing Function As a Tool For Learning? 242

References 247

Appendix 263

LIST OF IMAGES

Lisa October 1997 37

Maria Anna 45

Figure 1 A model of the classroom made by the children in my class 62

Figure 2 Child's floor plan of the classroom 68

Figure 3 Teacher's floor plan of the classroom 69

Figure 4 Topic Web 70

Figure 5 Drawing the flashlight 87

Figure 6 Editing window in Final Cut Pro. 96

Figure 7 A section of my computer screen showing three video clips placed for comparison. 97

Figure 8 The drawings the two boys in the video clips were working on. 98

Figure 9 Jenn's first observational drawing 122

Figure 10 A fat caterpillar struggling out of its skin. 126

Figure 11 Jenn's chrysalis. 128

Figure 12 Jenn's drawing of how butterflies look to us. 131

Figure 13 Jenn's drawing of how butterflies look to other butterflies. 132

Figure 14 Drawings from Jenn's original book 134

Figure 15 Drawings from the reconstructed book. 134

Figure 16 The Vygotskian Metaphor of Water. (from Wink & Putney, 2002) .. 136

Figure 17 Verbal thought. (from Bodrova & Leong, 1996) 141

Figure 18 Visual thought. 141

Figure 19 Zone of Proximal Development 144

Figure 20 Recursive nature of the zone of proximal development.. 147

Chapter One

Introduction and Background

I have organized this study under five chapter headings, 1. Introduction and Background, 2. Context For The Study, 3. Methodologies, 4. Presentation and Analysis of The Data and 5. Conclusion and Recommendations.

1. Introduction and Background

This chapter introduces the research questions and provides a review of the literature concerning young children and drawing. Reflection on my studio project provides additional background information to the study.

2. Context For The Study

In this chapter I provide the viewer with an insight into my teaching philosophy and program dimensions, as well as provide a floor plan and a topic web outlining the areas being studied by the children.

3. Methodologies

This chapter reviews the use of still images, video, and hypermedia as research tools. I also provide a description of Vygotskian, social constructionism as the perspective I have taken for the data analysis.

4. Presentation and Analysis of The Data

In this chapter I present my data on a CD that accompanies this text. My data analyses can be found both on the CD as well as in the text. On the CD I follow Ed's learning journey through four topics to provide a structure to help the viewer navigate through the data. The topics are Flashlights, Light Traps, Shadows, and Cameras.

5. Conclusion and Recommendations

The final chapter summarises my findings and offers recommendations based on my analysis.

Reading The Study

There are two ways to read or view this dissertation. My preference, and my design, is for the viewer to navigate the dissertation almost entirely through a hypermedia[1] environment as supplied on the enclosed CD. This hypermedia environment presents the viewer with an image-based reading which, I feel, will facilitate an appreciation of the study that is congruent with the manner in which it was developed. In recognition of those viewers who like to curl up in their favourite armchair with the larger chunks of text, within the hypermedia environment I have provided printable PDF files that match the chapter headings.

The dissertation can also be read in a more traditional book form text as I have outlined in the introduction. The visual data referred to in the text can be accessed on the CD enclosed at the back of the text. This CD is an integral part of the dissertation and should be viewed to gain a full understanding of the study. The analysis headings in the text match the titles on the side menu on the screen and the hyperlinks at the bottom of each page.

Background To The Study

This study, explores young children's drawing in the context of my Grade 1 classroom and begins where my previous Master's study left off. The earlier

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[1] I use the term hypermedia in much the same way as the term hypertext is used. "Media" refers to the drawings, the photographs, the video clips, the texts, and the diagrams. "Hyper" refers to the fact that many of these media are linked and interactive.

study combined Action Research with Interpretive Inquiry to examine the drawing processes of the children in my Kindergarten class at that time (1996). I worked to extend drawing across the particular learning contexts of that group of children, and I was interested in the role that I, as the teacher, played in the provision for and involvement in their drawing events. Some of the data were collected using video, however at that time the technology was not accessible for me to integrate video into the presentation. The study was text based with reference to a few reproductions of children's drawings. It was organized in a traditional manner with each chapter addressing a particular aspect of children's drawing and references to the literature woven throughout.

My approach to, and presentation of, this new study is very different. I have incorporated and reflected the visual nature of my research at each stage of the research process. I have developed a methodology that is congruent with my study of drawing and visual thinking. Developing the methodology for this study has probably been of as much interest and concern to me as the actual research on children drawing[2].

When I examined Kindergarten children drawing I found that drawing was used spontaneously, purposefully, and extensively in their everyday activities. I discovered that I could extend drawing opportunities by providing spaces, places and an easily accessible range of drawing materials across all areas of the children's learning. If drawing was preceded by multi-sensory explorations then

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[2] When I use the word "drawing," I mean the drawing process as well as the actual drawing produced.

the drawing events were more elaborate and sustained. When the children were encouraged to talk about, share, and revisit their drawings, this helped them to become aware of different possibilities for representation and to extended their drawing repertoire. As their teacher, modelling drawing helped to encourage children to draw and to develop a wider drawing vocabulary. Drawing engaged the child with the subject for longer periods of time in meaningful ways. Drawing seemed to give children more time to think as it mediated between thought and action. Many of the practices that I discovered to be effective during the course of my Masters study were utilised in the Grade 1 classroom and formed a strong foundation for this study.

When I started to teach both the Grade 1 and the Kindergarten children to write I noticed that there was a decrease in the amount of drawing they did. The unintentional message I was giving them was that writing was to replace drawing as a means of communication in a school context. Several children found this perceived silencing of a previously valued voice disturbing. I became aware that drawing as a means of communication was something children valued and should therefore be one that their teacher supported. I wanted to find out more about why and how drawing was such a powerful meaning-making and communication tool for young children.

The two main research questions that guide this study are:

1. What is the relationship between thought and drawing?
2. How can drawing function as a tool for learning?

Two related theoretical questions arose when planning a Vygotskian, social constructionist perspective for analysing the data. They are:

1. What does a social constructionist perspective of drawing reveal?
2. Can drawing be an activity that leads development?

This study uses video not only as a data collection tool but also as a means of processing and of presenting data (Goldman-Segall, 1998). New and accessible technology has allowed me to use video in each part of the research process. A growing interest in Visual Research (Prosser et al., 1998) has provided much of the recently published theoretical support for my use of visual artefacts as well as digital ethnography in this study. The development of hypermedia environments has opened up new ways of conceptualising research as well as opportunities for collaboration and interaction during the research process. Hypermedia also provides a manageable way to store, access, and present quantities of visual information. Visual images, Digital Ethnography, and Hypermedia are discussed in more detail in the Methodology chapter. The data for this study are comprised of video footage taken in the classroom during project time, children's drawings, models and written texts, photographs, and field notes. These data were collected during a three month period from April to June.

My doctoral study has been an interdisciplinary, combining Elementary Education and Art and Design. My work has been divided fairly equally between the Faculty of Education and the Department of Art and Design. My decision to situate half my work in Fine Arts was to provide me with a stronger background in Fine Arts and the drawing process. I undertook a full time two-year studio project

in drawing that culminated in a solo exhibition in a gallery. I wanted to understand the process of drawing from the inside out as well as gain credibility as someone who had experience in Fine Arts. It was an invaluable experience that opened up new ways of thinking about drawing that I had not been aware of before.

I chose to bring a Vygotskian, social constructionist perspective to the analysis of the data, collected from my Grade 1 classroom, because it was congruent with my understanding of the teaching and learning process as well as my practice. I have outlined this perspective in the chapter entitled Methodologies. However, this is only one way of looking at the data and my hope is that others will bring different perspectives as well as extend my analysis.

As an early childhood educator I work in a multidisciplinary context. The team of professionals involved with this age group often includes speech pathologists, occupational therapists, physiotherapists, psychologists, and psychiatrists. Each brings a different perspective. Collectively they can help to develop a more elaborate and in-depth profile of what is happening for children in their learning contexts. The exchange amongst us extends our own repertoire and understanding of children. Early childhood educators also work closely with families and the community. Partnerships between families and the community are strengthened by ongoing discussions focused on the well-being and education of the child. This study also works to emulate this collaborative, multidisciplinary discussion that is congruent with early childhood practice and to support the multiple perspectives that can promote a deeper understanding of the child.

The Setting For The Study

The study took take place in an alternative school, Kindergarten to Grade 3, within a large public school board in Alberta, Canada. The data were collected over a period of three months from the ongoing activities of my Grade 1 class. My focus was on the children's drawing in relation to their learning through the Grade 1 curriculum. The classroom space was large, the seating arrangements and work areas informal. There were 23 children in the class, 18 boys and 5 girls, with an average age of 6.2 years. This was an inclusive classroom that integrated children with special needs. There was one teacher (myself) and a teaching assistant in the room at all times working with many differently combined groups. The families of the children were extremely supportive of the program. A Master student in Early Childhood assisted me with the video data collection three days per week for a period of one hour each day. This student assistant came during the children's Project[3] time when the most drawing was likely to occur. All of the children in the class were included in the study, however some feature more prominently than others. Those children are featured because of the pertinence of their work to the study. All the children are given pseudonyms. Had any child or family declined to participate at any time the group structure would easily have accommodated this. The children in this classroom were very familiar with the use of video and sometimes used it themselves to record various aspects of their work and surroundings. The topics

[3] For more information about Project work visit www.project-approach.com

the children were studying at the time were Light, Shadows, and Cameras. We began by exploring light and shadows because these topics seemed most easily to lead into a study of cameras. The story of this study is told through the children's work displayed on the CD and in Chapter Four entitled Analysis. The analysis of the drawing events is also to be found in Chapter Four.

Young Children and Drawing: A Review of The Literature

Like many early childhood educators, I have been inspired by the work of the teachers and children of the Reggio Emilia schools in northern Italy (Edwards, Gandini, & Forman, 1993). Their exhibit, The Hundred Languages of Children (Glenbow Museum Calgary, 1997), is a remarkable display of young children's drawings, paintings, and photographs and the documentation of children's competencies in representing their thinking and their learning. I have also been challenged to understand how and why they do what they do. Why would they invest so much in the visual arts? What do they mean by the hundred languages of children?

The Reggio Emilia Schools are a group of city-run early childhood schools serving infants, toddlers, and preschool children and their families. Over the past 40 years the educators in these schools have evolved a distinctive approach to education. It is an approach that fosters children's intellectual growth and development through a systematic focus on symbolic representation. Through the many "languages" of movement, painting, sculpture, shadow play, collage, music, writing, and drawing the children explore the environment in which they live.

Loris Malaguzzi, the founder and former director, cited a comprehensive and diverse range of theoretical and political influences that underpinned the educational decisions made at the Reggio Emilia schools (Edwards, Gandini, & Forman, 1993). In the early days of the schools (1950s and 1960s) Malaguzzi mentioned John Dewey, Henri Wallon, Edward Chaparede, Ovide Delcroly, Anton Makarenko, Jean Piaget, Lev Vygotsky, Erik Erikson, Uri Bronfenbrenner, Pierre Bovet, Adolf Ferriere, and Celestine Freinet. He went on to cite a second wave of scholars from the 1970s and 1980s; Wilfred Carr, David Shaffer, Kenneth Kaye, Jerome Kagan, Howard Gardner, David Hawkins, Serge Moscovici, Charles Morris, Gregory Bateson, Heinz Von Foerster, and Francisco Varela. From this eclectic list, he and the teachers,

> received ideas both long and not so long lasting - topics for discussion, reasons to find connections, discordances with cultural changes, occasions for debating, and stimuli to confirm and expand upon practices and values. And, overall, (we) have gained a sense of the versatility of theory and research. (Edwards, Gandini, & Forman, 1993, p. 53)

While I agree with Malaguzzi's insistence that "a unifying theory of education that sums up all the phenomena of educating does not (and never will) exist" (p. 81), from this list, and his descriptions of the work of the schools, two giants of early childhood emerge, first Jean Piaget and then later Lev Vygotsky. Malaguzzi and the Reggio teachers' interpretation of these two psychologists helped me understand some of the educational decisions they made.

Malaguzzi acknowledged with gratitude the role Piaget played in demonstrating, through a close observation of children, a logic in children's behaviour that operated on the same principles as those that guide scientists in

their inquiries. At the same time, Malaguzzi was critical of educators who adopted some of Piaget's theories for purposes they were never intended. He was also critical of some of Piaget's theories themselves.

> Now we can see clearly how Piaget's constructivism isolates the child. As a result we look critically at these aspects: the undervaluation of the adult's role in promoting cognitive development; the marginal attention to social interaction and to memory (as opposed to inference); the distance interposed between thought and language (Vygotsky criticized this, and Piaget, 1962, responded); the lock-step linearity of development in constructivism; the way that cognitive, affective, and moral development are treated as separate, parallel tracks; the overemphasis on structured stages, egocentrism, and classificatory skills; the lack of recognition for partial competencies; the overwhelming importance given to logicomathematical thought; and overusage of paradigms from the biological and physical sciences. (Edwards, Gandini, & Forman, 1993, p. 76)

Malaguzzi agreed with Piaget that the aim of teaching should be to provide conditions for learning rather than for instruction. However, to inform the nature of these learning conditions Malaguzzi turned to Vygotsky. "Vygotsky reminds us how thought and language are operative together to form ideas and to make a plan of action, and then for executing, controlling, describing, and discussing that action" (Edwards, Gandini, & Forman, 1993, p. 79). The connections between thought and language are loosely and implicitly drawn in Reggio's stories. This link between thought and language, that is central to Vygotsky's thinking, forms the foundation for my study. It is Reggio's interpretation of "language" that intrigues me. It has helped me to think about the connections between thought and language in ways that extend our interpretation Vygotsky.

The Reggio schools turned to the arts, particularly the visual arts, to help them explore the many ways in which children might learn about and explore their world. They felt that there was a process of exploration that was inherent in the arts that would free educators to think differently about children, while at the same time liberating children from a system that privileged the written word. They invested in this idea by integrating an atelier (art studio) and atelierista (art instructor) in every school. However, the ateliers are more than art studios. In the ateliers of the schools the children, teachers, atelieristas, and members of the community come together to explore many different languages of learning. They undertake extended and in-depth projects which investigate the world around them through the many different modalities or "languages" of the arts. In addition to their work with the children, this team of teachers and researchers investigate issues as wide ranging as the influences of the mass media, to gender differences in symbolic and expressive preferences. (Edwards, Gandini, & Forman, 1993) It is to this model of integration of the arts that I turn when looking for guidance for my own teaching and research within the discipline of early childhood education.

When I turn to art education literature for guidance on children's drawing, I also bring my early childhood perspective with me. My reading is focused and bound by the context in which I work and the four research questions I have:

1. What is the relationship between thought and drawing?
2. How can drawing function as a tool for learning?
3. What does a social constructionist perspective of drawing reveal?

4. Can drawing be an activity that leads development?

Theories of artistic development in the last half century derive both from art in the art world and cognition in psychology. While the two perspectives derive from different disciplines, cognitive development models that focus on children's abilities seem to mesh well with assumptions held by modern art (Parson, 1998).

One of the problems I encountered during my reading was the use of the word "art," as well as the term "drawing." Kindler (1997) notes the semantic ambiguities embedded in the label "art." "Reference to 'art,' an open concept (Weitz, 1979) that is subject to change and re-definition as a function of time, space, and specific cultural and social circumstances, poses inherent problems in posing a simple and stable model" (1997, p. 2). Wilson and Wilson (1997) suggest that, "when we look at different classes of children's creations from different aesthetic or ideological positions, our interpretations lead to quite different conceptions about what is classified as child art, how it develops, and the function it plays in children's lives" (in Kindler, ed., 1997, p. 82).

My interest in the relationship between thought and language, and in the meaning-making capacities of drawing in relation to learning, would seem to relate most readily to the branch of literature that deals with psychology and cognition. In this study I consider drawing not so much an art form but rather a cognitive process that is integral to children's learning. I examine the children's drawing processes as they occur across the curriculum. I classify any mark the child makes on a surface as drawing. When drawing is used by the children

within the social groupings of their peers in the classroom it is part of a wider system of representation that includes talking, gestures, facial expressions, writing, model making, and role play. The relationship that drawing has to the context in which it is being used is of primary importance for me. How is the child using drawing to assist their learning?

Arnheim (1969) and Golomb (1989) talk about the child as a problem solver. They examine children's drawing and sculpture problems. The problems that the children in their studies are working with are problems that are inherent to the particular graphic media (or clay in Golomb's case) that the children are using. They also discuss the nature of the visual problems the children have to solve in order to represent their ideas. For example, the representation of a three dimensional object on a two dimensional surface. The argument being that problem solving that occurs within the context of visual presentation is of value to the child's overall development as a problem solver. This argument as Parsons (1989) points out,

> is a "medium-specific" view of cognition (that) coincides with the predilections of modern art and - in my view - it has provided the power of the paradigm. It is now, however also a source of weakness, now that our conceptions of art, and of cognition, are changing. (p. 82)

There are many examples of studies that are based on assumptions drawn from cognitive psychology and modernist art theory in the art education literature. Freeman's (1977) studies of occlusion in children's drawing determined that it was not until about the age of eight that children were able to draw one object behind another. Maureen Cox (1991) extended the study of occlusion

begun in Freeman's work and has conducted her own studies on the use of transparency in children's drawings. Cox and Freeman work in the tradition of developmental psychologists who try to determine chronological benchmarks.

Salome's (1965) statistical studies of visual perception in the 1960s, built upon the work of McFee (1957) which argues that children need rigorous drawing programs which would teach them the specifics of drawing. Costall (1997), in relation to view-specific drawing, has criticized the notion that children will become better at drawing by attending to their retinal images. He asserts that children's progression towards view specific drawings is due to cultural convention. Chandler (1997) probably best balances the very different points of view apparent in the perceptual studies I have just referenced:

> Theories about perception tend to emphasize the role of either sensory data or knowledge in the process. Some theorists adopt a data-driven or "bottom-up" stance, according to which perception is "direct": visual data is immediately structured in the optical array prior to any selectivity on the part of the perceiver. James J. Gibson, (1979) is the key proponent of "direct perception". Others (e.g. Richard L. Gregory) adopt a "constructivist" or "top-down" stance emphasizing the importance of prior knowledge and hypotheses. Both processes are important: if we were purely data-driven we would be mindless automatons; if we were purely theory-driven we would be disembodied dreamers. (p. 6)

Much of the research on drawing in early childhood seems to focus on how children learn to draw and how we might best instruct them. Elements of drawing techniques have been isolated and examined with a view to improving them. Extreme examples of this are the programs that Salome and Reeves (1972) and Salome and Szeta (1976) developed which gave children specific perceptual training. These programs managed to increase young children's visual

perceptual learning as well as the amount of visual information in children's observational drawings. Salome and Reeves showed how perceptual training of very young children could also benefit the children's readiness to read (1972). Frankston (1966) and Nelson and Flannery (1967) also examined the direct teaching of perceptual skills. Their focus was the relationship between teaching styles and students' drawing styles. They found a positive correlation between direct teaching of perceptual skills and children's drawing performance. While this emphasis on achievement supports our current preoccupation with performance, achievement, and assessment in education, narrow definitions exclude many different forms and uses of drawing that are evident in children's drawing (Kindler, 1997). If we are to look only for certain competencies in children's drawing then we are unlikely to notice the ways in which drawing is used and its potential for learning.

Nancy Smith's (1983) study of young children's observational drawings examined whether or not children did in fact draw from observation and then went on to look more closely at how they drew. She discovered that children's observational drawings were much more detailed and contained much more information than their memory drawings and that subjects of a more appealing or personal interest were likely to contain more elaborate information. She built upon this study by producing, in collaboration with the Drawing Study Group, a "How To" book for teachers on observational drawing.

Golomb (1997) considered children's drawing development in terms of a cognitive, problem-solving activity. Within a broad framework of human

development, she studied children's drawings as a creative search for meaning. She considered representational drawing to be a truly creative activity that is invented and reinvented in every generation and across different cultures to form a basic vocabulary of graphic shapes. She focused on cognitive activity that is motivated by a child's need to make sense of their world. She examined children's drawings for symbolic references to children's experiences. While Golomb's work has helped to us to acknowledge the competencies of young children's representational skills, her view of cognition as art in an individualistic sense does not acknowledge our recent recognition of the social and cultural influences on children's drawing.

Fein (1993) examined drawings for similarities amongst the drawings of children, artists, and drawings from the past. She looked for some developmental progression from descriptive pictures to symbols that are more abstract. She highlights some of the similarities between the progression of children's drawings and a historical or evolutionary progression over time. However, she considers the symbolic graphic structures she describes to originate from some inner imperative rather than the child's optical experience. Fein seems committed to modernist notions of art and psychology that seek to discover universal benchmarks not unlike the developmental models produced a generation earlier.

Project Zero (Davis, 1997; Gardner, 1983; Gardner, Howard, & Perkins, 1974) also considered problem solving in children's representations. Project Zero combined the thinking of Goodman (1976,1978), Arnheim (1966, 1969, and 1974) and Piaget (1948). Its early research helped to shift the focus of art

education from a Lowenfeld model that emphasized the release of and expression of emotion to one that focused more on the cognitive processes involved in the arts. Researchers used the same aesthetic criteria that were applied to professional artists. Construction of images and communication through the arts was viewed as a kind of literacy. It was out of this research that Gardner developed his theory of multiple intelligences.

More recently, Davis (1997) writes of the "u" curve of graphic development that recognizes young children's art as having the same aesthetic qualities as professional artists have. Between the age of five and eleven this artistic competency drops off and then plateaus never to be regained. Traditionally this loss has been seen as something inevitable and irreversible unless the adolescent or adult decides to make art their chosen career and regain their competency. She challenges the education community's lack of concern for this loss of a meaning-making skill, "How bleak for our educational system if we were to embrace this approach across disciplines and only teach writing to those who will become professional writers, or math only to those who will become mathematicians" (p. 55). She advocates that drawing be taught every day just as math and writing, and hands over the task of drawing literacy to curriculum experts and teachers.

Consideration of visual and media driven problems in the context of my own study created a dilemma for me. How I responded to the problems that the children inevitably encountered as they worked to represent their ideas could potentially influence the child's own perception of drawing and its value to them.

It was sometimes challenging as a teacher to differentiate between a child's cognitive puzzle and a problem a child was having with drawing. Sometimes the drawing problem created a block that the child could not move beyond until a solution was found.

Art education and early childhood education have been influenced by the developmental, cognitive constructivist theories in similar ways. Developmental theories in art originate in the work of Lauquet (1927) who used naturalistic observations to describe stage-like progressions in children's drawing. He assumed that children's drawings were based on an internal mental model. He identified five stages of development. In the first stage, "fortuitous realism" a child recognizes a likeness between their spontaneous scribble and something known to them in the world. The child's discovery that his or her marks can be representational leads to more intentional mark making. Lauquet calls the next stage "failed realism" when referring to the child's inadequate skills for producing a likeness, and "synthetic incapacity" when referring to the child's inability to place marks in correct spatial relationships. The first stage of successful intentional representation is called "intellectual realism." This is where the child draws not only what they see but also what they know. The child then progressed onto "visual realism."

Piaget adopted Lauquet's ideas and incorporated them into his developmental framework (Piaget & Inhelder, 1948/1956). However, for Piaget drawing was not a special domain of development but merely a window into the child's general cognitive development. He argued that a child's drawing

performance reflected the child's cognitive competence. Until a child reached the concrete operational stage of development, he or she was tied to egocentric mental models of the world. "Only when a child enters fully into the stage of concrete operations can she combine concepts of perpendicularity, parallelism, seriation and proportion with her new ability to discriminate different viewpoints and selecting a viewpoint to depict, produce visually realistic drawings" (Smith, 1998).

Piaget's stage framework of cognitive development has been critiqued and a large body of experimental work that examined the dichotomy between intellectual realism and visual realism has been undertaken (Bremmer & Moore, 1984; Cox, 1985; Davis, 1985; Light, 1985; Taylor & Barcharach, 1982). While these experiments have established some of the conditions under which intellectual and visual realism can occur they tell us little about why particular marks and graphic forms are used by children to construct their depictions.

Arnheim (1974) argues that the development of drawing in young children is one of progressive differentiation. He describes the child's development in drawing as the progressive production of graphic forms, either invented or taught, by which the child tries to realize his or her intention for a particular picture. However, Arnheim sees these progressive differentiations being driven largely by aesthetic considerations. He recognizes schematic drawings as necessary steps towards depictions that are more complex rather than deficient representations. As the child gains control of an expanding repertoire of graphic forms, he or she

can deploy them for various functions, depending on the child's purpose or culture.

Kellogg (1970) analyzed hundreds of children's drawings from around the world and identified twenty different basic scribbles. She suggests that these scribbles were acquired in a developmental sequence and that there might be a chronological framework that describes drawing in terms of cognitive development. She suggested that children need to progress through the described stages and viewed the omission of detail as lack of knowledge or misunderstanding. Researchers for whom cultural influences play an important role in drawing development have criticized the suggestion that drawing development has principles that apply similarly to children in different countries across the world. Wales (1991), in a study of pictures produced by Aboriginal children in Australia, examines what can occur when children are exposed to quite different cultural influences. He makes distinctions between a child's mental representation and the different ways that may be used to realize that mental representation pictorially. Wales cautions us to consider the cognitive, personal, and cultural factors that should be taken into account when studying children's pictures.

Examination of children's representations of the human figure have been undertaken by Goodnow (1977) and Cox (1993) to determine developmental progression and cognitive benchmarks in children's drawings. Freeman and Cox (1985) have examined a variety of drawing problems with young children using a developmental framework. While Cox does acknowledge differences in the

representation of the human figure in different cultures, these studies seem to be primarily concerned with determining the age at which certain drawing behaviours most likely occur. Children's drawings, particularly figure drawings, are still used in the cognitive assessment of young children.

These models of development have resulted in, "a curriculum based on sequential activities tied to stage-by-age dependent behaviours and the assumption that children's growth is a naturally unfolding process that cannot essentially be changed" (Freedman, 1997, p. 95). This paradigm is starting to be challenged. As Parson points out, "it's universalist implications and individualistic views of learning sit uneasily with our awareness of the diversity and importance of cultures; and its prohibition of linguistic thinking in art fits poorly with our postmodern interest in meaning and context" (1998, p. 82). Freedman compiles a list of criticisms of a stage-by-age developmental paradigm that is quite similar to that compiled by Malaguzzi (previously mentioned):

> First, behavioral analyses resulted in positive and negative classifications of people by group. Second, the learning of informal knowledge, which is also an important aspect of schooling, was not taken into account. Third, the social attributes of image construction and recycling were not given serious attention (until the work of Wilson and Wilson, 1977). Fourth, the social construction of art disciplines was not analyzed in relation to expert-novice development. (p. 99)

Recent studies by the Wilsons (1982) and Smith (1993), while concerned with enhancing children's drawing skills, are also concerned with the reasons why children draw and the influences on children's drawing.

Wilson and Wilson (1982) challenged the notion that children's drawings ought to be allowed to mature naturally without any outside influences, by either

imitation or instruction. In their extensive studies of children's spontaneous drawings they found that children teach themselves to draw by copying from a whole range of other graphic images found in their culture. They contend that young children learn to draw mainly through imitation and influence. They propose that children should indeed be encouraged to share their drawing skills with each other as well as copy the work of well-known artists in order to learn to draw better. This approach to drawing instruction draws upon traditional European art school practices of learning from the Masters, a sort of apprenticeship model. They suggest that children would also be well served to copy from the traditions of Fine Art (1987).

Newton and Kantner believe that our understanding of culture is critical to our understanding of the development of children's aesthetic development. It is their belief that, "definitions and ideas about culture add further support to current postmodern stances about the intricate relationships between art and its cultural context" (1997, p. 166). They acknowledge the significance of Vygotsky's socio-cultural theory, and see it as a valuable contribution to new ways of thinking about development. They cite the work of Bruner (1983) and Cole, Gay, Glick, and Sharp (1971) who consider the importance of social mediation and Vygotsky's zone of proximal development as a way of thinking about artistic development that acknowledges the role of the social context. They caution against researcher cultural bias when studying children's art. "In our postmodern world, this appreciation for diversity found in 'others' is not only of value, it is essential" (1997, p. 178).

Kindler and Darras (1997) also approach the notion of plurality in drawing. Rather than thinking about artistic development as a linear progression, they develop the metaphor of a map. This model describes three segments of artistic development.

> The first segment deals with gestation, birth, and development of pictorial imagery in the early childhood years. The second segment is concerned with the phenomenon of 'initial imagery' (Darras, 1986, 1988, 1992a), a basic, stable, and efficient system of pictorial representation which seems commonly accessible. The third segment describes the many roads that may be followed in the development of pictorial imagery. These roads are not to be regarded as mutually exclusive choices, since one may travel through many of them throughout one's life. (p. 23)

They draw upon Vygotsky's conception of the nature of development, in particular the interweaving of the biological origins of development with the socio-cultural origins. They describe two distinct processes at work that are responsible for the qualitative and quantitative changes we see in children's drawings. "We suggest that diversification and the increase of complexity of images is due to two types of operation: incrementation and bifurcation" (p. 22). However their emphasis on the biological origins of development is perhaps contrary to Vygotsky's original theories that work to move beyond these spontaneous responses toward a higher mental functioning.

Drawing on an article by Wolf and Perry (1988), Kindler and Darras (1997) suggest that "as children grow they develop an expanding repertoire of strategies of pictorial representation which they apply according to the perceived needs and functions of their drawings and the context in which their work is produced" (p. 34). They note the differences between work that is created at home and school,

spontaneous drawing, and drawing that is completed in response to a specific task. They argue for the necessity of an extended repertoire of what is understood to be drawing.

> One of the characteristics of the postmodern world is the increased interest in pursuit of multiple interpretations and meanings. "Recognition of diversity, plurality of perspectives, and acceptance of the fact that the observed phenomena often acquire significance specific to the social and cultural contexts in which they occur allow for re-visiting of conceptions regarding child development in art from a different stance." (Kindler, 1997, p. 1)

Wilson and Wilson (1982) list several reasons why children draw, among which is the need to convey thoughts and ideas and the use of drawing as a means for creating working models of the world. They state,

> Drawings provide an early means, perhaps the first, by which ideas and feelings may be made concrete and perceivable - they leave a record as no other childhood means of modeling reality can do. Early symbols . . . have at least some visual correspondence to objects in the everyday world and are easily understood. With them, the child soon learns to create complex meanings.(1982, p. 36)

Wilson and Wilson assert that both the ease of acquisition of symbols and the flexible way that drawing allows ideas to be developed makes drawing an essential activity that should be encouraged in children. However, like Kindler and Darras, their work examines children's spontaneous drawings that happen outside of the context of the classroom. Both assume that spontaneous drawing rarely happens within the classroom and are critical of an education system that neglects the child's spontaneous repertoire. I hope to bring a more inclusive perspective to my study of drawing in the classroom by focusing on drawing events and how children create meaning through their use of drawing.

Nancy Smith addresses a concern that is often raised in relation to children's drawings when she states that, "Most people believe that the primary purpose of drawing is to create a visual illusion. They also believe that illusionism is achieved by making an accurate replica of retinal image" (1998, p. 6). She finds this position unacceptable and she quotes the artist Nathan Goldstein (1977),

> All drawings motivated by a wish to inquire and to experience. . . are *responsive.* They are all founded on our intellectual and intuitive judgments about a subject and its organized expression on the page. . .
>
> Here *responsive* refers to our perceptual, aesthetic, and empathetic interpretations of a subject's properties that hold potential for creative drawing. In responsive drawing, comprehending a subject's actualities precedes and affects the qualities of our responses. Such drawings do more than recall what our inner and outer worlds look like. They tell us what our intuitive knowledge informs us it is. (In Smith, 1998, p. 11)

Golomb (1993) raises a similar issue in relation to her own research on children's acquisition of a meaningful graphic language.

> When we step outside our value system of judging drawings as faithful replicas of objects, we are struck by the insight of preschoolers that the drawing is a mere representation and not a copy. The cognitive processes that underlie this achievement indicate a competence to relate objects and their graphic representation in a manner that does not confuse one with the other. (p. 21)

This same ability to deal successfully with the duality of the object in the real world and its graphic representation is an important factor in my own study of children drawing. I believe that the children's ability to differentiate between the object and it's representation allowed the children in my study to use graphic images to pursue ideas and questions they had about the world in which they lived.

Some of the recent studies I have described acknowledge the importance of the social and cultural contexts in which drawing occurs as well as the processes involved in drawing. They have called for new ways of looking at the development of drawing, one that is more cognizant of the polyvocal nature of drawing. There is still much work to be done in this area and it has been suggested (Koroscik, 1997) that it would be helpful if there were more interdisciplinary collaboration and discussion amongst psychologists, art theorists, and educators. In my study, I have attempted to bring some measure of interdisciplinary perspective to the study of children drawing. Observing the drawing processes in the context of my classroom and providing examples of the connections between drawing and current learning theories in early childhood education will, I hope, help teachers to translate theories into practice. My hope is that my study can help to refocus the importance of children's drawing for teachers and psychologists.

Reflections on My Studio Experience

This section is a reflective piece of writing about some my experiences while working on my studio project in the Department of Art and Design. I describe this very personal journey in order to provide background information about my role and perspective as artist.

In the second year of my Doctoral program, in the Faculty of Education, I took an Action Research course from Dr. Terry Carson. One of the texts for the course was The Struggle For Pedagogies: Critical and Feminist Discourses as Regimes of Truth, by Jennifer Gore (1993). In the process of discussing this text I

became aware that if I wanted to better understand drawing then I would need to experience the discourse that surrounded art and drawing first hand. I needed to live the discourse to understand what it was like. The following year I changed my degree to an interdisciplinary degree between the Faculty of Education and the Faculty of Fine Arts. I would do a two-year studio project in drawing and participate in critiques and seminars with students who were working on their Masters in Drawing. It was a unique opportunity and one that I greatly valued. I was allocated a studio space with the students working on their Masters in Drawing and for two years became part of their community. The expectation at that level was that we would explore new ways of working with drawing in order to create new meanings. It was like stepping into a different world. The first thing that struck me when working in the drawing studios was the very different concept of time and use of time. Time for sharing experiences, ideas and talking with other students and time for thinking was valued. Time to mess around and to explore different ideas, even if they did not turn out as expected, was supported. There was time for process. But most of all I felt that the effort involved in coming to a deeper understanding about what we were doing and why, was something that was recognised and valued, and was something that could not be rushed. However, I have to say I worked harder and put in more hours during these two years than at any other time in my studies.

I had three very supportive art advisors who worked with me over the period of the two years. Two from Fine Arts, with printmaking and installation backgrounds, and one from Art Education, with a photography background. Not

only did each bring their unique perspective; each mentored me in different ways. Apprenticeship and its extension, mentorship, is an integral part of the program. I think the notion of mentorship is an important one. In a Vygotskian sense, "mentors often initiate the cycle of information, access, and opportunity. They open the door for novices/apprentices to know, to go, to do" (Wink & Putney, 2002). However, in order for this notion to work effectively and create occasions of transformation the process needs to be reciprocal. A dialectical relationship should exist where ideas, information, access, and opportunity flow both ways and work in cycles of progressive consequences that expand the understanding and knowledge of each. It is not a linear progression where one particular component of information, access, or opportunity precedes another, but rather an intertwining or overlapping of ideas, information, access, and opportunity that exists in dynamic relation to one another and expands and grows in multiple directions.

> A Vygotskian relationship of mentor-novice can be likened to a spark plug . . . the teacher-mentor brings the spark; where it goes with the learner/apprentice is unknown, unlimited, and uncontrollable. In return, the novice offers a spark for the mentor as the collaboration prompts the mentor to re-envision the issue at hand. (Wink & Putney, 2002)

When working in my zone of proximal development, a mentor can assist me with ideas and problems and help me progress from what I cannot do today, to what I can do with help, and eventually to independently reformulate and transform my own learning. The best support offered in the zone of proximal development is one that is unobtrusive and almost invisible. This allows the learner to feel

ownership for their learning in ways that are empowering and support independence. I can only allude to the impact my supervisors made on me.

When an art supervisor entered my studio our dialogue reflected all the elements of a mentorship relationship. The ideas I was grappling with and how these ideas might be expanded upon, explored further, reinterpreted, and re-represented was the focus of our conversations. More questions were raised than answered. We were always digging deeper. If the conversations with children about their drawing were as challenging for them perhaps children would seek to rise to the challenge as I tried to.

My studio project is a documentation of the process of gradually understanding what it means to work in a collaborative and dialogic way with drawing, not just with my supervisors but also with my subject. It could also be a documentation of my search for a way of working with drawing that was more engaged with my subject. I felt working this way might be good preparation for me if I were to try to understand how drawing might be used in a dialogic, meaning-making manner for young children.

In addition to my discussions with my supervisors, my inspiration for my studio project came from several other directions. The first was an acquaintance with Ellen Dissanayake when she visited the University of Alberta as a distinguished visitor. The title of her book, Homo Aestheticus: Where Art Comes From and Why (1992), intrigued me. I had often asked this question myself. Her perspective on art making had a strong anthropological sense to it. She described the many fascinating ways art is an integral part of everyday life,

ceremonies, and rites of passage in many different societies and cultures around the world. She looked closely at the function of art in people's everyday lives and how it helped to shape the fabric of the society in which it was produced. It was a very different perspective from the traditional studio exercises that formed the foundation of my own art making. Dissanayake's ideas had a certain relevance to the kind of ethnographic study I was undertaking with young children's use of drawing. Her view reflected the socially integrated use of art that I had noticed when observing young children drawing in my classroom. This integrated and socio/cultural perspective of art seemed to match the kind of learning experiences that I valued in my teaching. In my discussions with her, I also began to see ways that I could work with my own drawing in a more personal and ethnographic way. If I shifted my focus from a purely autonomous and individual approach to representation to a more dialogic, empathetic way of to trying to understand the "other," whatever or whoever they might be, I might be able to find a different way of working with drawing. This shift of focus might also bring my own drawing more in line with the ways I suspected children used drawing.

My other source of inspiration came from a collection of essays edited by Suzanne Lacy, Mapping the Terrain: New Genre Public Art (1995). These essays were the outcome of a series of lectures and events, City Sites, by ten artists that were delivered in non-traditional sites to a diverse audience. The City Sites series was, "itself a model for new genre public art - socially engaged, interactive art for diverse audiences - as it featured mass media, education, and the identification and development of specific constituencies" (Lacy, 1995).

Lacy makes the distinction between public art and new genre public art; "new genre public art - visual art that uses both traditional and non traditional media to communicate and interact with a broad and diversified audience about issues directly relevant to their lives - is based on engagement" (Lacy, 1995). This definition resonated with my work with children and with the ways in which I had observed young children use art. It also offered ideas for my own search for engagement. However, the definition Lacy initially offers is not that simple and the essays are an exploration of the problems encountered in the shift that is taking place in the art world in general and the role new genre public art plays in that shift. The shift under discussion is a shift from "the dominant modes of thinking in our society (that) have conditioned us to characterize art primarily as specialized objects, created not for moral or practical or social reasons, but rather to be contemplated and enjoyed. Within the modern era, art (that) was defined by its autonomy and self-sufficiency, and by its isolation from the rest of society", (Gablik, 1995) to an art that is more polyvocal, collaborative, and engaged. The ten artists argue that there is a growing recognition that art and creativity can no longer be viewed as isolated and individualistic endeavours but are rather the result of a collaborative and interdependent process. They suggest that artists, "step outside of the old framework and reconsider what it means to be an artist. . . Looking at art in terms of social purpose rather than visual style, and setting high priority on openness to what is Other" (Gablik, 1995). When reading these essays I noticed parallels between the changes the art community was experiencing, and the philosophical shifts that were happening in education.

In particular the shift in thinking from the individual constructing his or her own understanding independently of others to a recognition of the role that the socio/cultural contexts play in learning, the shift from cognitive constructivism to social constructionism.

Both Majozo (1995) and Dissanayake (1992) would agree that, "the assumption that art could be anything separate from the life that sustains us, that art is indeed a luxury, is as false a theory as the notion that the outer terrain can undergo transformation without affecting the soul" (Majozo, 1995). In these readings I get a sense that in this new way of conceiving of art there is the possibility for creating meaning and a way of better understanding the world we live in.

Armed with these few readings and with only a vague sense of where I was going I embarked on a collaborative exploration that involved drawing and the "Other." I invited a friend, Cristina, to enter into a two-year exploration of our everyday lives. I would draw, she would sew, and we would both watch to see what happened. This exploration was not a big social event like Lacy's Crystal Quilt (1987) that transformed the lives of many elderly women in retirement homes. This was small and safe, but it was an exploration that did impact on, and transform the thinking and lives of both myself and Cristina. The collaboration was an almost ethnographic exploration of the minutiae of everyday living that help to give shape and meaning to our lives. In order to move outside of the studio, where my drawing tended to be an isolated and individual endeavor, and to understand Cristina's context better we decided I should come and talk and

work in her space. As I did with my own teaching, and the children's study, I took my video camera and recorded many of my sessions with her.

I would like to look back to my studio experience and unpack some of the things I learned. I would like to begin by using some Journal extracts to examine where I started in the studio. For a deeper analysis of my drawing of Cristina I have borrowed a method from ethnography where Okley (1994) describes using old photographs to stimulate the recall of memory of past events. In this case, I used the drawings that I made from my collaboration with Cristina to recall some of the events and some of my discoveries. I have not referred to all the drawings nor is it possible to unpack two years of work in a short text in this context. I struggled to translate a visual and kinesthetic experience into words so that readers might get some idea of the process I went through. I hope that my drawings will also speak to the process. These drawings can be seen on the CD under the title of Studio.

The Beginning

The drawing studio classes I have taken over the years have comprised mostly of figure drawing. I have always been very happy with this emphasis because people are endlessly fascinating and challenging to draw. However, there was a gap between my experience of models in the studio and my experience with people in my everyday life. This gap was something I was becoming particularly dissatisfied with and journaling was one of the ways in which I tried to understand this. I would like to use some of my journal entries to give a sense of the nature of my concerns, as well as provide a reference point

for where I began in relation to the Studio component of this study. I also hope that the narrative description of life in the studio helps give a sense of what it was like to work in this particular studio environment.

I wrote this piece in October of 1997 when I was taking my first general graduate drawing studio course before embarking upon my interdisciplinary work. It is one of several pieces that I wrote in response to drawing the model in the studio at that time.

The Artists Model (October 1997)

I met Lisa, our model for today, waiting anxiously at the locked door of the studio. She stood clutching the sheet of paper confirming where she ought to be and her purpose for being there much as a swimmer who has swallowed too much water might clutch the edge of the pool. A life line. A prop to ease the transition through a difficult passage of time. She was coming to a strange place to be among strangers for the day. Yet, she knew she could not relax or converse with us as one invited to my house for the day might. She was invited into our space but once in it would be set apart. She knew we would require her to take off all her clothes. We would gather around her creating a watchful arena in which she would be the centre of attention but not the star. We would put her on a pedestal and examine her with an intensity she would not experience anywhere else. We would look closely at every detail of her body in a way that we do not have license to do in another setting. We will each draw out of her our own representation and in so doing will recreate her, rename her for ourselves.

She followed me anxiously up the stairs to the studio where I introduced her to the other drawing students who were already busy arranging their spaces and materials. They stopped briefly to say hello then quickly returned their task of settling into their own spaces, into themselves. Lisa was abandoned to the task of piecing together, out of fragments of suggestions, ideas and conversations that were never really directed at her but always involved her co-operation, our plan for her this morning.

Sensing we were keen to begin she went off and changed from her clothes into her robe. She returned to the studio holding her bundle of clothes tightly to the front of her as if for reassurance or protection. One of the students had placed an old mattress against the wall and covered it with an off white cover. This was in preparation for her sustained pose of the day that would follow the initial gesture or loosening up poses. She knelt curled and hugging herself on the mattress waiting for her cue to take her robe off, the front of her neck flushed with anxiety, every muscle tense. I felt anxious for her. My gesture drawings would be tense. Suddenly I did not want to do the gesture drawings. I went out and sat under the trees, breathing quietly.

I returned to find her settled shyly against the wall on the mattress as if sitting in the sun. Her sun was the bright halogen spill light above her, angled to give more defined contrasts to the light and shadows on her body. She seemed like a rabbit caught in the glare of headlights.

I spread my paper, charcoal and inks on the floor in front of her and sat back on my heels to look and to feel my way into the drawing that was about to

unfold before me. I have to withdraw into myself. I have to loosen my hold on the day and lose the everyday me. I have to look for something deeper and search deep within myself if my drawing were to belong to me. As I ran my eyes over her body searching for a plan, a place to begin, something significant to capture in the drawing, she became no longer the person I had met at the door. My searching over her body began to uncover my memories and experiences of all other bodies I had ever seen sitting in a similar attitude. As these remembered body images superimposed themselves over this body, I lost sight of Lisa. She became everybody. My gaze travelled from the foot, which was closest to me, up the line of the leg, across the smoothness of the belly, over the rounding of the breasts, around the arms folded still, but more gently now, and up the flush of the neck. I felt her eyes on me and I was shaken from my objective stance into a subjective one. Our eyes met and for an instant I recognised the anxious Lisa. I smiled reassuringly but could not bring myself to scrutinise her face. As I moved quickly to sketch out the form I had uncovered I was aware of beginning just below her eyes. It was as if by omitting her eyes I could free myself to draw myself into the picture. Her eyes held her name and Lisa was still too fragile for me to draw.

Although her frame filled the page, I could not connect with her. I was forced to think about the techniques of drawing and use this opportunity to play with mediums and combinations of mediums. This drawing became abstract in the sense that although the model was present she was just a frame upon which

I built line and wash, tone and contrast. It was a drawing about technique not about Lisa.

Lisa October 1997

When I revisited this piece of writing and looked more closely at my thoughts and the language I used to express them I became aware of some of the issues that may have contributed to my concerns when working in the studio with the model.

In this example, it was this models first time to pose for us and her lack of experience and composure forced me, perhaps for the first time, to relate to her as a person rather than something we drew. It threw the position of objectivity, which is often assumed when one is drawing, into sharp contrast with my more interactive relations outside of drawing. The sentence, *She was invited into our space but once in it would be set apart,* emphasises the attitude that we, as art students, had towards models. There was little interest in who this person was,

what her life was like or how it might affect the interpretation of her. The model was there to serve the purposes of the students, the artists. There seemed to be a belief that the expressive uniqueness that was expected in each drawing was something that resides within each of us individually and had little to with model.

We will each draw out of her our own representation. I have to look for something deeper and search deep within myself if my drawing were to belong to me. This statement stood in sharp contrast to my interactions with people in my life. The assumption that there would be no dialogue between the model and the artist seemed to confirm for me that the general perception in this context was that drawing was an individualistic process that was guided by the traditions of art making.

In this context, the notion of getting in touch had more to do with getting touch with our own creative spark and ourselves. That we had to look deep inside of ourselves, through the model, was grounded in the practice of beginning a model session with gesture drawings. Gesture drawings aimed to capture the essence of a pose. The drawings were usually done very quickly and intuitively, without much attention to details. It was a visual and physical way of connecting to the model that was part of a long classical tradition of life studio practice. It would be almost unthinkable to supplement it or replace it by talking with the model either before or while drawing them. Perhaps because I did not participate in the gesture drawings in that session I was more able to reflect upon what we were doing with the model. I became acutely aware of perpetuating the conventions and representations of women in western fine art practice.

Representations were often meant to be universal metaphors for masculine desire, creativity and culture. These forms of representation seemed to have little to do with this particular woman. *As these remembered body images superimposed themselves over this body, I lost sight of Lisa. She became everybody.* Traditional representations of the female nude had come to connote beauty, wholeness and in many ways art itself. The history of art itself is an area of scholarly work formed within a masculine tradition. It is a tradition that tends to objectify the female body for whatever purpose. (Meskimmon, 1996) Objectification was also part of a larger scientific discourse that supported pure, scientific objectivity and that was suspicious of subjectivity.

We would gather around her creating a watchful arena in which she would be the centre of attention but not the star. We would put her on a pedestal and examine her with an intensity she would not experience anywhere else. We would look closely at every detail of her body in a way that we do not have license to do in another setting. Not only did we displace, confine and put the model in a position of surveillance, but we also striped her of any personal identification. We would then superimpose our own or others identities over hers. This imbalance of power between the model and artist made me very uncomfortable.

...the bright halogen spill light above her, angled to give more defined contrasts to the light and shadows on her body.

This drawing became abstract in the sense that although the model was present she was just a frame upon which I built line and wash, tone and contrast. It was a drawing about technique.

It was at this point that I began realise that technique seemed to take priority over meaning in this studio. When instructors circulated the studio and talked with us about our work it was usually in terms of techniques or styles. The vocabulary that was used when my drawings were discussed informally as well as in class critiques comprised mostly of these descriptors:
active, background, balance, bold, burned out, busy, clarity, composition, contrast, crop, dense, depth of field, distracting, dramatic effect, element, evenly focused, expressive line, fading, flatten, flatten out, focus, foreground, formal composition, highlights, iconic, illusion of space, landscape, light source, mark making, movement of eye through image, negative space, obscure, oriented on page, pasted on, physicality, position, present, range of value, rendering, reversal, scale, section, sensitive drawing, shadow as subject, sit on page, sits in space, soften, stress, surface of the paper, tension, tonal, underlying structure, value range, volume, weight.

This vocabulary worked to support conversations that were concerned with the composition of the drawing, the drawing style and the use of materials. There was never any discussion about our relation to the model, her life or any other larger or more conceptual ideas.

The use of props like lights and pedestals were not really to create a context for the model but rather to accentuate contrasts in shadows or to exaggerate the form of the figure.

Working in a studio environment can be very insular. Sometimes we would be shown slides of other artist's drawings. However, these examples were all from 'dead white guys'. In this context, we did not get to see or discuss figurative work that was currently being undertaken by well know contemporary artists.

For the remainder of the semester, I tried to find different ways to relate to the models in the studio context. I also tried to find examples of women who were working with the figure, like Paula Rego and Cindy Sherman, and learn more about how they worked and why they did what they did. We took the models off their pedestals and talked with them. We set up different scenes, or tableaux, with them. Drawing started to become more than just copying the model in different mediums and styles. I now had to have a reason for making the drawing that went beyond such concerns.

The next fall and winter (1998/99) was the first year of my interdisciplinary program with Art and Design. There was just one Masters in Drawing student and me sharing the studio. After my explorations with the models last semester I was keen to get out of the studio but did not know quite how. Discussing my ideas over coffee one day with a friend from Printmaking, she suggested that I come and draw in her space to see what it might be like to draw outside the model in the studio context. The following is a journal extract from my first experience in her space.

Moving Out of the Studio and Entering Another's Space (October 1998)

I have turned the tables on myself and feel like a fish out of water. I am the stranger now in this person's space. This room is hers and every thing in it speaks of her being and who she is. Her work, her thoughts, her movements leave living trails of artefacts which tell the history of who she is and how she works and thinks. This is her space. She is relaxed in her space, knows without looking where everything is and so can move easily to deeper levels of being and thinking. I am the awkward one who is afraid to disturb the random order and waits anxiously for her to tell me where I can be and what I can do.

I felt like an intruder. Although I was invited in, this was not a social visit. I had come to work in her space, to draw Maria Anna. I would create a space for myself here and both take from her as well as leave behind traces of my being here. Both she and I knew what it meant to draw another; intimate and personal. However, neither of us knew what it was like to draw another in this space, in this way. It was the first time for both of us and carried all the awkwardness of a first date.

I fumbled around with rolls of paper and drawing boards. I was determined to use full size sheets of newsprint and begin the way I was trained, with large gesture drawings. There were no easels and I had to find a place to prop the board and still be able to see her. I ended up crouched uncomfortably in a corner with my board wobbling on the edge of a chair. I had to concentrate on holding onto the board as well as the drawing.

I did not want her to pose for me. I wanted to feel as if I had walked in unseen and had caught a moment of time in her life. A critical moment that told of her life.

Maria Anna was preparing for a showing of her work that would mark the culmination of a Masters Thesis in printmaking. As she worked she told me bits about the work.

The willows that she was wiping with graphite paint she cut last year with her father. It was a special time with him. An exchange of understanding between father and daughter. He is Italian and came from several generations of basket makers. The tradition was broken when he came to Canada. The process of cutting, bundling and wiping honoured both him and the work of craftsman's hands.

Marie Anna carefully and methodically wrapped her fingers with tape and pulled on latex gloves to protect her hands from the paint and sharp spikes of the willow. She has been doing this for several months now and piles of painted bundles lay stacked like huge coils of wire at one side of the room. Each one labelled with a date and time as a record of her labour. She had also saved the bandages and the used latex gloves as evidence of her labour.

She settled into her work sitting comfortably, with one leg crossed, in and old swivel chair by her desk. The chair allowed her to turn easily to the piles of willows and her paint without getting up. She took a new piece of yellow willow, leant over to the table and dipped her finger in the paint. Beginning at the thick end, she methodically wiped the paint into the willow.

I began my drawing, working quickly and loosely. First, the chair with her solidly settled in it, legs crossed relaxed but grounded. Then the desk and some sense of the space around her which seemed to enclose her and speak of her.

She stroked the paint down the length of willow and as she did it whipped in arches around her as if springing to life. She took another and began the process again. Live arcs of released tension flew around Marie Anna as she rubbed the paint in.

I tried to draw her hands but they were continually moving. I had to watch and wait for the moments when they returned to the position of my last drawing stroke to add another line. As I waited, watched, and drew, a pattern of her movements built up on the paper and I discovered the rhythm of her work in her hands.

She had almost forgotten me. I saw a quiet meditative look come over her face and she settled into herself. She told me how this process, this time alone methodically wiping willows, had helped her find her way through the huge task of pulling her work together. She will miss the quiet meditation it had brought her when it is all over.

Rereading this piece brings back memories of the initial challenges of drawing outside of the studio. They were both physical and psychological. It was very cumbersome to have to transport my drawing equipment there. It was awkward to find a comfortable place to draw and I could not easily access my materials. In the studio, my space was arranged so that my materials were easily and automatically accessible and I had enough room to move around freely. With

a familiar space, I was free to concentrate on drawing. This new space was cramped, unfamiliar and visually distracting for me. I wanted to go and examine all the interesting artefacts around the room.

I was fascinated with Maria Anna's story about her work and her conversation with me hugely influenced what I chose to include in the final drawing and how that drawing evolved.

Maria Anna

This drawing was done on two sheets of paper- the sheet on the right was drawn first.

The framing of Maria Anna is similar to the frame I had while in her room, chosen then more by circumstance of space than for any visual organisation. I placed her centrally in the picture frame and tried to show the movement of her swing in the chair as well as the whipping of the willows.

However as I worked on the drawing I realised I needed to include the story Maria Anna had told me of her father.

Well into the drawing, I realised that it was too contained, too centred on Maria Anna. It did have the feeling I had of working in a small confined space however the memory of the huge coils of willow at one side of the room keeps pushing forward, adding context and credibility to her task. Rather than begin again and have to reframe and re-scale the drawing I added another sheet of paper. I chose to leave them detached just in case it did not work out. As I worked with the two sheets they began to symbolise the present and past; connected but not joined. Maria Anna on one page and the coils of her fathers past on the other. I saw the two pages and their subjects speak to the relationship between self and work, one page the process and the other the product. Viewing them separately allowed me to value both more easily yet still see the connection between them.

Even although this drawing begins to look at the figure in a context and for reasons that had more to do with the identity of the model than previously it was still very referential in execution and composition. I was still mostly replicating what was there. I was still being driven by the techniques in which I had been trained. I drew several other women in their own contexts throughout that year; Cristina was one of them. Eventually I settled to draw just Cristina and try to develop a sense of reciprocity at a more complex level. The images in the Studio section on entitled Reciprocity were created to give a sense of what I meant by reciprocity. I hung a two sheets of clear plotter film about eye level and about four

feet apart, one with a photograph of myself drawing and the other with Cristina sewing. The viewer could then look through the images from any angle and see us working in many different relations to each other.

Cristina Sewing

The first drawing, "Cristina Sewing," takes me back to where we started. It helps me remember some of the initial hurdles we had to overcome. It also helps me give a bit of background to who we are.

I have known and worked with Cristina for about fifteen years now. We know each other as friends, as teacher-colleagues, and we share an interest in children's drawing. Cristina has just retired from teaching. Like me, Cristina is a fairly new immigrant to Canada. We both miss our families and the way of life we knew. Cristina is from Chile. She married a Canadian and has a Canadian family now. Cristina had a plan for this first drawing. She chose sewing as a metaphor to describe a part of herself. She wanted to sew while I drew her. It was sewing that helped her feel that she belonged here in her new country. Sewing is also a skill she loved to share with the children she taught. Sewing also reminded her of her past, when the women of her family and the neighbours would sit together and sew and talk over the events of their lives, forming a bond of mutual understanding she does not experience much here and which she misses. The sewing basket was given to her by one of these women and it must be included in the drawing. She explained that the sofa she chose to sit on is an old one she had found and stripped down and recovered. This recycling of old objects was something she learned to do in Chile; to make do with what she had, but to

rearrange, renovate, or change things to make them more beautiful to live with. "We do not throw things away in Chile like you do here," she reminded me. Sewing made her feel comfortable in herself so that she could allow me to scrutinize her more closely than I ever had before. There is an awkwardness to being watched that I forget when I use professional models. She placed the shawl she often wrapped herself in for comfort at one end of the sofa to enclose her.

Finding a space to draw in this context was a new challenge for me. Cristina's living room was quite beautiful. It had an off-white carpet which set off the treasures she and her husband had collected from around the world. Everything was aesthetically arranged. I was terrified of disturbing her order and of making a mess. I had to spread an old sheet over the area I planned to work in and perch my board and charcoal precariously on an old chair. I had to kneel to be at the right height to draw. I felt physically awkward and I was uncomfortably conscious of her self-consciousness. This new role of looking at her to draw her put a strange distance between us and I felt ill at ease in her space.

Changing paper was impossible because there was nowhere to put anything down. So I just drew over and over on the same paper, building up a layered drawing which gave a lot of information about the sitting; how tucked into the corner of the sofa she was and which parts were static and which shifted and moved. The rhythm of her sewing was evident in my marks. This way of drawing is something I was used to doing in class and it transferred nicely to this context. It is a loose and gestural way of drawing that often shows the essence of a pose.

However, the translation from these sketches and video loops into this drawing show nothing of this movement. Instead, I see a carefully arranged and balanced composition that shows the tension of composing oneself for viewing. It looks like a formal sitting, the sepia ink adding an historical ambiance of old photographs. It is a record of our first formal encounter. There is a referential aspect to this drawing that is similar to the children's first drawings of an encounter with a new object or concept. The drawing is a record of the point at which our separate experiences and ideas first came together and existed in the shared space between us. The separation and awkwardness we both felt shows in the drawing. When I was working on this drawing in my studio I had a memory of Cristina's expectations for the drawing as well as our awkwardness. Real collaboration was going to take much more work. My supervisors' response to this drawing was one of disappointment and they were very quick to point how shallow and referential it was. They challenged me to rethink how I could represent Cristina. My challenge was to move from this referential, first encounter to a concept that was more complex.

After this drawing, and at their advice, I spent some time with Cristina just sketching and talking in a relaxed manner without a particular goal in mind. She began to get used to my looking at her and I began to feel a rhythm in her sewing. However, loosening the rules that we each imposed on our understanding of what drawing was or ought to be was something that was going to be much more difficult than I expected.

One Stitch

The drawing titled, One Stitch, originated in my examination of the gesture drawings and reviewing the video. Both helped me to see the sewing movement as something that was rhythmical. Slowing the video clip down to more clearly see what was happening when stitches were made helped me to see repetitive patterns in the movements. These patterns showed up in the density of marks that I placed on top of each other as I quickly sketched the sewing motion. The editing window in which I viewed a small series of hand movements influenced the format for the drawing. While the image in that window showed all of Cristina, I felt that if I drew all of her I would lose the focus of her hands. I chose a closer view, and picked three points of movement of her sewing hand and used the other hand to anchor the movement. I eliminated much of the peripheral information and focused on the hands. Playing around with the pattern and folds on the fabric, I tried to use the visual patterns to represent the sense of pattern and rhythm of her movements. This process of editing what is seen in order to bring the viewer closer to my point of view is similar to the editing processes I have been involved in with video editing. It also reminded me of the difference in perspective that happened when the parent videotaped the children working in the classroom. Without the focus of extended looking at a particular event, the visual clutter of everyday life takes over and we can no longer see the significance of certain details. Without the trained eye of observing children at work the parent was at a loss to know which parts of the general scene were important. Extended looking is something we do not usually do. However drawing

often demands extended looking. Extended looking reveals many things we tend to overlook or make assumptions about or take for granted. My extended looking at aspects of sewing helped to mediate between the referential looking I began with to include a more thoughtful looking. In the classroom it is this focus that drawing brings that is so helpful when children want to know more about something. Extended looking that is involved in drawing mediates between an initial referential encounter and a more complex and engaged relationship with an idea or concept. However, extended looking is not something we generally do with young children.

From the Inside

From The Inside is really a series of small drawings that work together as a whole. I had been feeling that I was still looking at Cristina rather than with her. I wanted to be able to get closer to her and see how she might see herself sewing. This meant moving in very close to her so that I was looking over her shoulder. I was right in her space. This involved quite a lot of trust and respect for both of us.

When I worked on the drawings in my studio I felt a need to work in a similar enclosed space so I put the drawings in a corner and worked out from the corner. This way I would bring the experience into the studio. In this drawing I also wanted to overlap some of my perspective and I did this by closing my left eye to make the drawings on the right of the corner and my right eye to make the drawings on the left of the corner. The two drawings that met at the corner were the same stitch but look different because of having one or the other eye closed.

Closing one eye is something that I do a lot when I am drawing because it flattens the field of vision and makes it easier for me to pick out simple shapes. Laying Cristina's perspective over mine worked for me to bring our points of view together through the drawing. Working in a corner made me feel as claustrophobic as I did when I was working close to Cristina. The individual drawings are similar to the One Stitch drawing in that they are a series of frozen movements from one stitch. In this series I put each drawing in a shadow box to try to preserve the feelings of intimacy that I felt when making the drawings.

When the time came for me to present my work in the gallery space many things that seemed right and natural to me in the studio did not transfer into a gallery context. I had thought I could bring an ethnographic study into the gallery by keeping some of the ways of working intact in the presentation. However the gallery space was quite formal and somehow seemed to call for work to be hung on the walls. I felt a tension between what I had been trying to do and what was expected of me as an artist. It seemed as if there was a way of presenting oneself that had to preserve a public image or expectation of the artist. It seemed as if suddenly there was a new set of hidden rules that I could only discover by bumping into what I could and could not do. I wonder if young children feel like this when they are drawing in my classroom. Did I have an equally inaccessible set of rules that did not hear what they were really trying to do? Incidents like these caused me to think very carefully about the spoken and unspoken messages I was sending to children when they were drawing. Was I able to align

myself closely enough with their vision that I did not exclude any of their first and perhaps tentative voices?

This series of drawings was also the first time I had separated a drawing into multiple images. I found it exciting that I could use such a small idea and still have so many images for it. More images seemed to make the idea more important. I have noticed children drawing the same thing repeatedly and making multiple images of one idea. I used to worry that they were stuck and not making any progress. Now I can see the value of repetition. It is part of the same need to focus and examine in more detail.

The Knot

The theme of movement, rhythm, and time was expanded once more through the close examination of a different sewing action, a knot. I explored the use of a simple line drawing and worked with the rhythm of the movement. I was encouraged to use a lighter approach.

This drawing was made in a small room and ran around three of the walls so that it almost encircled me. When I stood in the middle of the room, I had to swivel around to see the whole drawing. I had wanted to keep this circular feeling for the presentation but again the gallery space made this difficult. The people who worked in the gallery were very aware of the limitations of the gallery and sympathetic to me and several artists who had struggled with similar issues.

Making these three drawings involved the slowing down of tiny movements and examining them more closely. My discussions and drawing with Cristina took on a different nature. When the focus of my looking was on

something that she could also look at, she became less self-conscious and more conscious of her sewing. She was able to join me in looking at sewing as a process on which we could work together. We also began to share the camera. She would take footage of me drawing and focus on what I was doing. We often watched these clips together.

It was at this time that I began to realize that the content of our conversations was influencing the drawing focus. I had been watching the videotapes for movements and largely ignoring the conversations and the contexts. I started to listen to what we were talking about and was surprised how much she talked to me. When I draw I have to concentrate and I am not very responsive in a conversation. I just give the odd nod of affirmation occasionally. Her free flow of talk and my passive responses reminded me of the necessity to listen and for the other to be heard. Active listening is very much a part of teaching. Most women like to talk and the bonds they form with each other are through the intimate conversations they have with each other. It is the way we unravel and come to terms with our lived experiences. We heal our hurts, and try to come to an understanding of who we are and where we are going. We pick over our lives and pull pieces out for mending so that we can move on. Sometimes it is a painful process that we can only do in the presence of another we really trust.

Mending 1 and 2, and Listening

The three large drawings entitled Mending 1 and 2, and Listening, were drawn from our conversations. The drawings are very large in recognition of the

importance of the conversations. The subject of mending is an everyday, almost invisible and undervalued task. It is a very feminine task. For Cristina, an everyday task she found meaningful was elevated and celebrated through these huge drawings.

These drawings surrounded me in my studio as I worked on them. They were so big they literally created temporary walls so that when I stood with them on three sides of me it felt overwhelming. I could not step back and easily see them from a distance; instead, I had to look at the drawing marks that I had layered like threads and fabric on the paper. I had a sound track of phrases and extracts from our conversations that I played as I looked at them. In my studio it seemed right and natural to view them this way.

Making these drawings was the point at which my collaboration with Cristina ceased to be a studio project we were both working at and became something much more important and deeper. It was now something in which we had invested personal meaning. The making of my drawings and my meetings with Cristina were heavily invested with meaning of a very personal and social nature.

The complexity that was part of my collaboration with Cristina was beginning to show in the drawing. I was encouraged by my supervisor to extend some of the metaphors that seemed to show through but was advised to keep them mysterious and hidden so that it would invite multiple readings, so that I was not just documenting my experience with Cristina but connecting to more complex ideas about relationships in general. It was in responses to these

drawings that I became more conscious of drawings as artefacts that were open to different interpretation by others, some interpretations that I never intended. This was an interesting experience and one that was quite freeing. Other interpretations helped to extend the life and the possibilities for a representation. This notion carried over into my presentation of the data from study of the children's drawing. While I could be author, I could also create spaces for others to become involved as author too.

However, there seemed to be something about my drawing style that also sent contrary messages to the complexity that I was striving for. My marks held the history of many hours of studio practice that elicits a more referential viewing. It is as hard to change your drawing mark and style as it is to change your hand writing or your accent. It seems to be part of who you are. I was beginning to feel my drawing mark was as much of a stigma as a foreign accent.

This was when I started to consider other mediums as a way of representing what I meant. The children in my class have little difficulty or few inhibitions about mixing their mediums and it seems to work for them. They work intuitively to create meaning for themselves. One of my supervisors was particularly encouraging about working with the hand and coming to know through the hand. I was not really quite sure what she meant at that time. As an adult, I did not feel so free to work intutively because I was aware that materials carried cultural messages and I was not sure what my boundaries were. It seemed safest and natural for me to look again at my use of video as it was already part of my process. In relation to my own interest in video and its use in

art I had been studying the work of William Kentridge and Tony Ourslar. Kentridge takes stills of his charcoal drawings and composites them into an animated video loop and I was fascinated with the process. It seemed to offer me a new way to present the sequences of drawings on which I had been working and a new way of describing time. It would also allow me to keep my focus on the drawing process while also slowing down the process. I planned a series of drawings that showed both the acts of sewing and working with fabric as well as exposing the act of drawing in process. I set a timer for 3-minute intervals and took over 300 stills. I then composited these stills into a video loop that was then projected onto cloth. As when working with any new medium it was fraught with technical problems and in the end it should probably be viewed as an interesting experience or perhaps part of the search for new ways of working. Like many new ideas that unfold in the process of doing, it was difficult to articulate what I was doing and why while I was doing it. This happens a lot in the classroom when children begin with the most fragile germ of an idea. I struggle to understand what it is they are trying to do and they struggle to tell me. Often I have to give them space to work the idea through and then later unpack it with them. Sometimes the act of making our ideas public helps us to clarify meaning for ourselves. I see this, too, in the work of the children. As a child struggles to explain an idea, suddenly the idea becomes clear to them. There seems to be something in the dialogic relationship that assists the clarification of ideas and new understanding. There was no real dialogue with Cristina for the video

drawings and perhaps if there had been the outcome might have been more satisfying.

Watching Cristina sew for well over a year made me want to experience sewing. Watching me draw had the same effect on her and she got out her own drawing materials. A spontaneous crossover of experiences began to happen. I began by sewing dolls and then sewing paper patterns. The dolls were three-dimensional but the paper patterns I sewed remained flat as opaque coverings for other drawings. They were like skins that covered and hid those parts of ourselves we kept hidden. For several months and with much patient encouragement and dialogue with supervisors, I experimented with tissue paper and skin and sewing. I explored all kinds of ideas and ways of using these new materials and none of them felt right. I made quite a mess and hit many dead ends. It was a period of great frustration for me as I no longer had any map of where I was going or how I was going to get there. It was a very intrapersonal experience where my dialogue was in my head and my hands and I was trying to get the two to connect. It was a time when I had to take all the information that I had been collecting about drawing Cristina and reconfigure it in a different way.

My anchor was that I was still drawing with Cristina as she sewed. She was working on an applique of a cloth butterfly for one of her daughter's shirts. On my way home from drawing her cloth butterfly I stopped at the butterfly house at the botanical gardens. In the corner of the butterfly house there was a mesh cage with lines strung across inside it from which rows of chrysalis hung. Three butterflies were emerging and the empty shells of others still hung there. For over

an hour I watched in fascination as the butterfly struggled to break free of its shell, crawl out, and pump up its wings to fly. I made many drawings of the chrysalis and emerging butterflies. I felt like one of the children in my class taking field notes and collecting information that I might use later in the classroom. I had no real idea of what it would be useful for. It just caught my attention and interested me and I stayed to watch and draw.

I made some small chrysalis shells out of tissue paper. The shape fascinated me. It has always fascinated me that a fat caterpillar could transform into something so very different. If you look closely at the caterpillar and the shape of the chrysalis there is a hint of the butterfly to come.

Transformation

The large hanging paper shapes originated in the both the paper skins I made and the models of the chrysalis. I consulted with Cristina about how to make them. Now I was sewing with paper and she with cloth. I made them the same size as we were. I chose wedding dress patterns to make them out of, silk to sew them with, and massage oil to rub them transparent. As they hung on their threads they responded to the movement of people close by. The heat of the body and even the breath made them move. I hung them so that not one of them would be alone and that they would always be in relation to others. I chose the social groupings to reflect some of the conversations we had had about people and places. I left spaces between them so that you could walk amongst them, feel their presence, and smell the oil. For Cristina and me they held memories of our conversations and some of the changes that came from sharing our ideas,

ambitions, concerns, and pain with each other, but we have moved on now. This joint activity brought a closure to this part of our collaborative project.

When I was making the large chrysalis-like forms I was able see how many things from the social, cultural, and historical context of this project had influenced my work. I experienced how we become part of the culture in which we live and how it affects what we do and how we do it. I also experienced the effect that I, as artist, might have on another. Not just by producing something for them to look at but through an engagement with their life. I look at the products of this project as the empty shells left behind from a much richer and more powerful experience.

Lacy (1995) describes the nature of an artist's engagement on a continuum between private and public. At the private end, she describes the subjectivity and empathy of the artist as experiencer. In the information revealed there is artist as reporter, while artist as analyst is concerned with situations and solutions. At the public end, she describes the artist as activist who is concerned with building consensus. She also describes the different criteria and outcomes involved in each and suggests what each has to offer society. It is a model that emphasizes the relationship between the artist and society and looks for ways to make what artists do seem more relevant to more people. She sees a potential role for art in the examination of meaning.

As I read the descriptions of the carefully choreographed public events in these essays, I was struck by the similarities between these events and the events that happened every day in my classroom – when I engaged, for

example, with the group of children who wanted to build a photography studio. These children each had their own ideas and experiences and they had to come together to build some kind of consensus so that the studio would be built. As the teacher I was concerned with making sure each voice was heard and respected and that workable understanding was reached. This meant finding some way to recognise each subjectivity through an empathetic listening. It helped that I too had been to the same studio and had noticed how each child had responded to the experience. We had our field notes to work from and as a teacher my job was to make sure all the information we had collected was revealed to everyone concerned. From this information, our task was to recreate the experience in a new and different situation and space for a different purpose. The purpose this time was that of making meaning out of the experience. The different materials we used, the roles we adopted and the interactions we had with each other would all work to create meaning and raise new questions. As the mediator and facilitator of this event, my role was not unlike the artists Susanne Lacy describes. There seem to me to be many parallels in the process of making art and in the art of teaching. Maybe my classroom is my studio.

Chapter Two

Context For The Study

This chapter gives the reader an overview of the context in which this study took place, what kind of program it was, and a sense of the kind of teacher that I am. It begins with my teaching philosophy which is posted on the Parent Information board in my classroom each year. The program dimensions follow my philosophy. This is an outline of the kinds of things I consider important when designing a program for young children. It is illustrated (see CD) with images taken from related events that happened in my program. I also include a topic web that shows the development of the topic being studied at the time of the research and a floor plan of the classroom.

Figure 1 A model of the classroom made by the children in my class.

Philosophy

> Central to my teaching philosophy is the interdependent nature of the relationships between the child, the teacher, the families, and the community. To say that I am child-centred would be to underestimate the contribution of the teachers, families, and the community to the child's

learning. Yet, I also know that it is essential to focus my attention on the child.

I consider the child to be culturally embedded. The elements of the child's life combine and interrelate to form a continually evolving and dynamic whole, where everyone involved is challenged to participate in the processes of exploration, questioning, creating, and learning. Children come to school already knowing and understanding many things about the world they live in. They come with a rich cultural history.

In the case of each child I honour the children's past by inviting myself into the children's world. I visit the children's homes and explore the children's spaces. I meet the families and friends and share and discuss parents' hopes and dreams for their children. I explore their communities to relive some of their experiences with them. Most importantly, I invite the children's world into my classroom with the children themselves.

Families are encouraged to share their expertise and ideas with me. Parents, children, and teachers come together as one big family for social events throughout the year. We all meet together at advisory meetings to discuss policies that will enhance the learning environment for the children. Families, in turn, support me by offering help with projects and sharing information about their children. Together with the children and the families, I try to create a community where everyone will have a space and a voice. It is by recognising the interconnectedness of children's lives that schooling becomes, for each child, an understanding of the world he/she lives in rather than isolated bodies of skills and knowledge.

I see the role of the school as being a place that invites the exchange of ideas among all those involved in the program. I try to develop a positive receptiveness to all concerned. The model is not fixed or static but evolves through a democratic process that acknowledges all contributions. I want the school to be a forum for exploring ideas about the nature of learning and childhood that will involve all those who are part of the children's lives. As teachers, we have much to learn from parents and children. The families who work with us are rewarded by a greater understanding of their child and of the teachers and an appreciation of the importance of their own role in their children's learning. (The previous statement was placed on the Parent Board in my classroom.)

I endeavour to be a teacher who studies children closely, provides occasions and opportunities, intervenes at critical moments, and shares the children's interests. I listen and watch for the kinds of strategies children use in learning situations. I am ready to provide the language, the materials, or space to

allow children to step forward. My attention is finely tuned as to know when is the best time to offer my assistance and how I should assist. I hope these things are done in such a way that the children are often not aware that they are being helped. I want them to be able to retain the responsibility for learning and continue to work with confidence and independence.

I like Loris Malaguzzi's metaphor for teaching and learning. He suggests learning is like catching the children's ball and then tossing it back to them in such a way that makes the children want to continue the game with us, developing perhaps other games as we go along.

My response to what children bring to me seems to be the critical element when I am discussing my role as the teacher. Am I listening closely enough to what they say that I can recognise the first, partially formed, and often tentative new insight and respond in such a way as to clarify the insight, restate it, and pass it back to the child to embrace anew?

This way of thinking about my role as a teacher is perhaps different from a curriculum-driven role where I might define my role through the traditional themes and activities I believe young children should be involved in. I tend to select and plan the most appropriate experiences for individuals and groups rather than viewing children as blank slates on which we engrave a predetermined and perhaps meaningless curriculum. Children want to make sense of the world around them and are more likely to be interested in topics that relate to their everyday lives.

Intellectual discovery is essentially a social process and my role is to provoke occasions of discovery through facilitation and stimulation of children's dialogue and co-construction of knowledge.

(Please refer to CD for related images.)

Program Dimensions

When designing a program for young children the following outline exemplifies the program dimensions and elements that I consider important:

Small group work allows me to:

- provide instruction for different learning styles
- facilitate discussion and exchange of ideas
- recognise the value of social interaction in learning

Investigation in Science helps children to:

- predict outcomes
- make plans and carry them out
- develop new understandings
- explore ideas and experiment first hand
- explain observations
- figure out how things work

Dramatic play allows children to:

- explore their knowledge of adult roles
- apply academic skills purposefully
- collaborate with others
- share and negotiate ideas

- develop confidence in self expression

Field experiences promote:

- the involvement of the community in their learning
- seeing interesting places first hand
- collecting information
- learning about people at work

Language and literacy provides:

- a home reading program that recognises the significant role parents have in children's language learning
- children with an effective range of strategies for reading
- writing and oral language as important components of language learning
- experience with a range of children's literature and information books

Multiculturalism and Social Studies acknowledges:

- the rich diversity of cultures within Alberta
- that through literature, art, music, and food there is an appreciation of traditions and ceremonies

Math and Logic:

- focuses on problem-solving
- stresses the use of manipulative materials
- provides instruction in meaningful contexts
- promotes the practice of skills across different contexts

Integration of Fine Arts allows:

- the Faculty of Education music staff to offer a special music program
- drawing, painting, sculpture, and printmaking to be integral parts of my program
- role-play and creative dance to help children personalize their understanding

Integration of children with special needs means:

- I believe in inclusive education
- there are well qualified staff who will provide support for these special children

Environmental awareness helps:

- the children learn how to take responsible care of their environment
- my endeavour to have an environmentally friendly classroom

Documentation of children's learning means that:

- I aim to make the processes of children's learning visible
- I document the role of the adult and child in the learning process through work samples, pictures, photographs, text, and diagrams
- I share my understanding with families, students, teachers, and professionals interested in knowing more about young children

I developed this program description when I first started teaching Grade 1. This outline has since been developed into an information brochure for the Child Study Centre school.

(Please refer to CD for related images.)

Space

The use of space in an early childhood classroom is extremely important. Where I placed the materials and how I arranged the work areas helped children to make connections between different aspects of their learning. Space for large and small group work, as well as individual work provided for a range of teaching and learning needs.

At the beginning of the year, the children explored the space in the classroom by drawing maps and building models. This helped them understand where things were, why they were there and how they could contribute to making the classroom an interesting place to be.

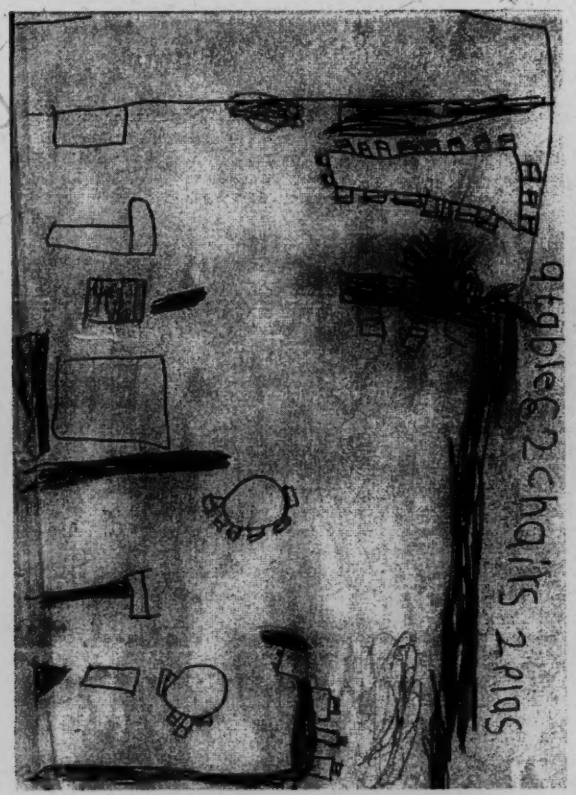

Figure 2 Child's floor plan of the classroom.

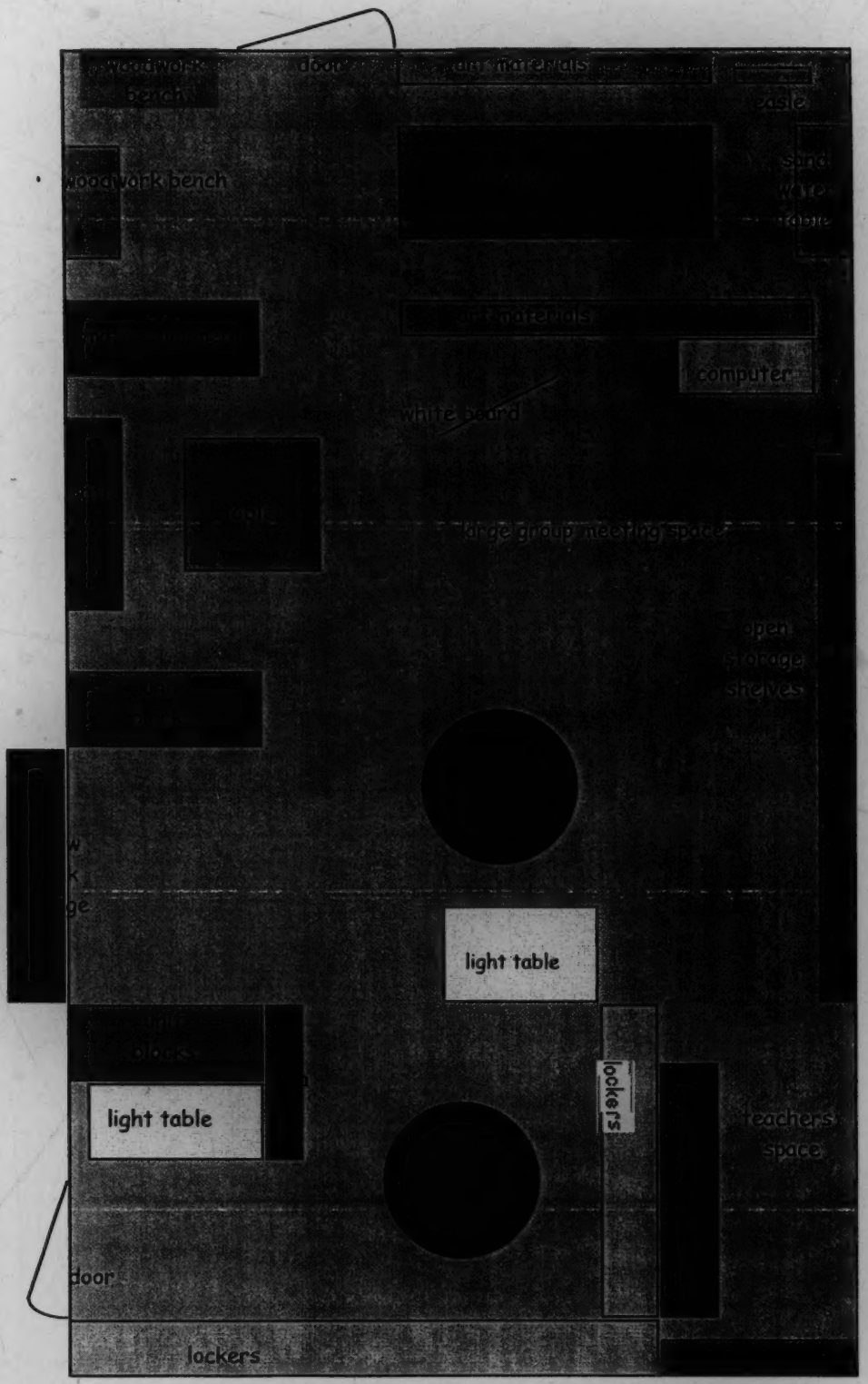

Figure 3 Teacher's floor plan of the classroom.

Topic Web

For each topic that we studied, we made a topic web. The following topic web is my initial topic web for cameras. The children also helped me make a web on the white board. A large topic web, with many more details, was made on chart paper and was used to guide us through the topic. The web structure provided a flexible approach to curriculum. Not all areas were necessarily covered and the order in which things were done was responsive to children's interests and needs.

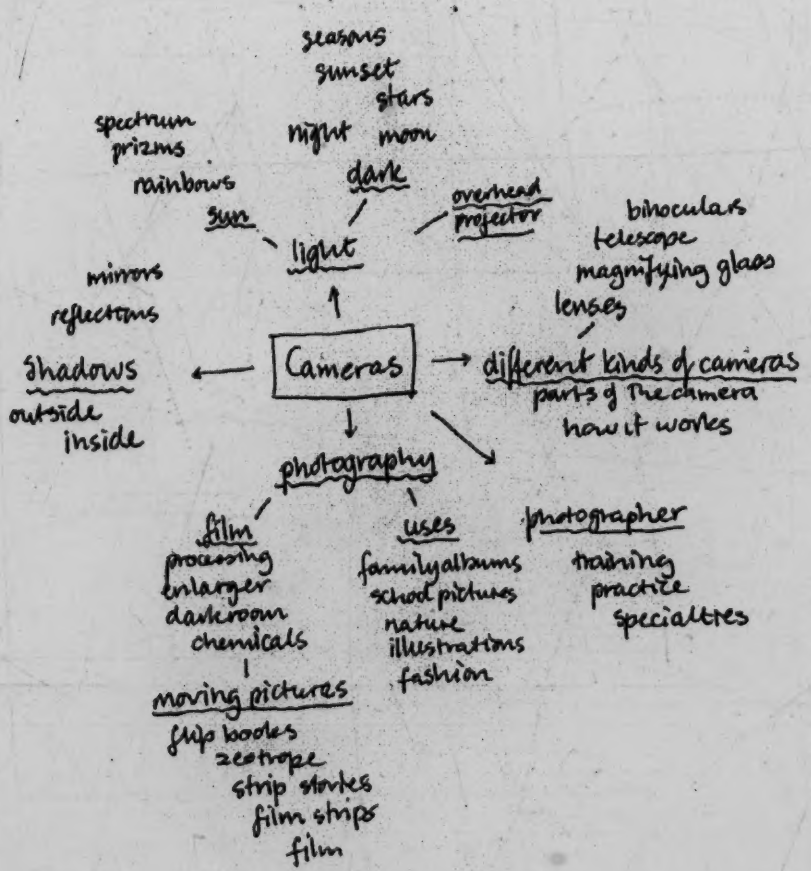

Figure 4 Topic Web.

Chapter Three

Methodologies

This chapter contains two different, but related, sections. I begin by describing my rationale for using Visual Ethnography and look at this methodology in detail. The second section, entitled A Vygotskian Social Constructionist Perspective, gives a description of the social constructionist perspective that I brought to analysing data.

Selecting a Method: Justifying a More Visual Approach

When attempting to understand the lived experiences of young children we are faced with the task of sifting through multiple layers of information that derive from a multi-sensory experience that is socially, culturally, and historically embedded. To understand more about how this group of Grade 1 children used drawing in the course of their learning I was challenged to find a method of data collection and representation that honoured such a population and context.

Traditionally the methodology for participant/observer (or in this case teacher/researcher) studies has involved a long and transformative process that is grounded in textual interpretations. It begins by the researcher observing and taking extensive field notes, supplemented perhaps with the recording and transcribing of interviews and/or conversations. Collecting artefacts or work samples may also occur which requires further description. This first round of data collection is transcribed into text for further examination. This text is further transformed and re-transcribed through another round of textual analysis and so

on until the final interpretation is produced as a thesis or article. Of course, this final text may also be open to further interpretations by the reader(s).

The question of validity in such cases, it has been argued[4], lies in the researcher's ability to provide a degree of believability, combined with a certain transparency that would allow a continuing communication with the thesis or text. The reader should be able to see that a "proper struggle"[5] has taken place with the text at every step of the way. A precise account in the form of field notes should, theoretically at least, be available to others so that further discussion or engagement with a wider audience might be possible. It is acknowledged that a final definitive position or agreement is not the end goal. Methods that rely on textual field notes that have been transformed into text-based stories or case studies borrow heavily from traditional academic ethnographic and anthropological approaches.

If I had chosen to use these more widely accepted forms of qualitative research methods, I would have had the security of a well-developed academic discipline. However, I feel they remain a, "logo centric approach to understanding (that) denies much of the multisensory experience of trying to know another culture" (Ruby,1996, p. 1345). I wanted a method that allowed me to collect a wider range of experiential data; one that acknowledged the multi-sensory, pre-

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[4] Miles, M & Hauberman, A. M. (1984) *Qualitative data analysis source book of new methods.* Beverly Hills. CA:Sage. In Harriet Bjerrum Nielsen, *Seductive Texts With Serious Intentions.* Educational Researcher.

[5] Ricoeur (1991) suggests that in interpreting a text there is always a struggle between a text and a reader.

textual, and cultural experience. I wanted to examine the contexts within which drawing occurred as well as the drawings. Visual Ethnography offers me some interesting possibilities.

Ethnography

Traditionally, ethnography has been a process of participation in a culture involving observation, interviews, and note taking. It has been a method for collecting data. Pink (2002) suggests that, "rather than being a method for the collection of 'data', ethnography is a process of creating and representing knowledge (about society, culture and individuals) that is based on ethnographer's own experiences" (p. 18). It is an eclectic method that borrows from other disciplines and is often developed during the research process so that, "the methods (should) serve the aims of the research, not the research serve the aims of the method" (McGuigan, 1997). I use ethnography to guide my research process. I combine it with other research processes like narrative, autobiography, and the visual arts.

In my classroom, as the teacher of the group of children I am studying, I am collecting information not only about the children's lived experience but also about my own lived experience.

> Any experience, action, artefact, image or idea is never definitively just one thing but may be redefined differently in different situations, by different individuals and in terms of different discourses... the 'ethnographicness' of any image or representation is contingent on how it is situated, interpreted and used to invoke meanings and knowledge that are of ethnographic interest. (Pink, 2002, p. 19)

My goal is not to produce a truthful account of reality but rather to offer a version that is as loyal as possible to the experiences of both the children and myself. The interpretations I made of the data reflects the particular perspective I brought to the data with the understanding that others can bring different perspectives. In this study, the perspective I brought was that of an early childhood educator and as an artist.

Visual Ethnography

Ethnography is increasingly integrating visual images within its practice (Goldman-Segall, 1996; Pink, 2002). "Visual images and technologies now form the areas, methods and media of ethnographic research and representations as well as the topics of university courses in visual anthropology, visual sociology or visual cultures" (Pink, 2002, p. 1). Duffield (1998) suggests that,

> the prowess of the visual method is in its potential to reveal something that can be grasped no other way. It enables the researcher to scan events and record for later analysis, giving more information than memory or notebook alone, it captures a sense of the event. (p. 1)

Video has the ability to represent things like gesture, expressions, sense of emotion, dialogue, and contexts in ways that written notes would not allow me as a busy teacher. While photography and video do bear some relationship to reality it has been argued (Jenks, 1995) that whereas objects are real and visible, visual images are a construction that rely upon the cultural discourses of the context in which they are interpreted. Thus, it is argued that reality cannot be

observed and that visual images can be interpreted differently by different people.

Wright (1999) suggests that the perception of the reality of the photograph is influenced by cultural conventions that support this view. It is common to refer to a photograph as a record of the reality of a situation. Photographs contain visible referents to observable phenomena and are likely to be treated as truthful recordings. Banks (1995) reminds us that, "all visual representations are not only produced but are also consumed in a social context, one which invokes a family resemblance to similar representations. Television and cinema in the case of film and video" (p. 3). We cannot assume that the information richness of film or video will necessarily bring the viewer closer to the subject. Viewers will bring their own reading and understanding to the images.

In order to address the problem of subjectivity Prosser (1998) suggests a measure of reflexivity that would make the researchers' perspective clear. However, Strecker (1997) has criticized this approach as researchers imposing their own interpretation and by implication indicating that there is only one way of viewing the image. While some (Loizoz, 1994; Ruby, 1977) have called for reflexivity to reveal the ethnographers' underlying epistemological assumptions, Worth (1972) and MacDougall (1975) are concerned that this would merely be an "aping" of a principle that is borrowed from scientific research that admits to conditions and human failings.

Bourdieu argues that, "the most trivial photograph expresses, apart from the explicit intentions of the photographer, the system of schemes of perception, thought and appreciation common to a whole group" (1990). As I collected images and video from my Grade 1 classroom, I would have been expressing the influence from my professional perspectives that derive from the discipline of early childhood education. However my studio art experience and my personal life must also have influenced this expression. Photography and video are often part of the ethnographer's personal as well as professional life. Inevitably there will be a cross over or interlinking between the two. I used a camera and video camera to record events in my studio, my home, and my work. I examined the ways my studio experiences interlinked with my research and classroom experiences in the section entitled Reflecting on My Studio Experiences. The intention I had for recording images must also have influenced my decisions as to what was recorded and how it was recorded. It is important to understand how each element combines to produce visual meaning and ethnographic knowledge.

Pink (2002) suggests that the most one can hope for is that observation and images will allow one only to interpret that which is visible.

Images

The interpretations of visual images are determined by the content of the image as well as the perspective or discourse brought to the image. It is possible for an image to have more than one meaning as well as more than one context. For example, the drawings I used in this study to explain a Vygotskian, social

constructionist perspective originated in my classroom several years ago. The child who created the drawings attached significant personal meaning to them at the time. These were shared with me, the teacher, who initially saw them in the context in which they were produced as evidence of learning within my classroom. No doubt they were also shared with the child's family and friends each of whom would bring their own reading and understanding to the drawings. The same drawings were copied and included in my previous research as an example of a child's drawing in my classroom. Several years later I returned to these drawings with a different perspective and used this perspective to help me better understand the drawings. I also use these drawings as a visual aid on a web site to reference the new interpretation.

Edwards states that, "the defining essence of an anthropological photograph is not the subject matter as such, but the consumer's classification of that knowledge or 'reality' which the photograph appears to convey" (1992). As the teacher who took photographs, and who collected drawings as part of my record keeping as well as part of my teaching practice, the boundaries of what might be classified as research artefacts and as teaching artefacts is blurred. Pink reassures that, "ethnographers can have dual (or multiple) intentions when photographing during fieldwork" (Pink, 2002, p. 57).

While this study does not fall neatly into the category of participatory or collaborative ethnography, the discussions that surrounded the drawings and photographs in the classroom context were important sources for informing me of

the children's perspective on these images. A conscious effort was made to engage children in discussion about the meanings they brought to the images. Harper (1998) suggests that those engaged in a conversation around a photograph the ethnographer has taken will also be trying to interpret the perspective of the ethnographer. Similarly, when discussing children's drawings with them I was trying to interpret the perspective of the child. That we as a class were also studying the topic of photography enriched the children's readings of some of the photographs. For example, they had experienced the processes of both having a photograph taken as well as taking a photograph. They were aware, at an experiential level at least, of some of the concerns around this experience.

My discussions with children about their drawings had some similarities to the way visual ethnographers talk about the meanings and memories photographs elicit for their subjects. For example, Okely (1994) describes her work with the aged in rural France where she found that sorting through a box of old photographs elicited memories that extended beyond a verbal linearity.

> Both of us pieced together the memories from whatever was picked up from the box, and created a synthesised whole. In reacting to the visual images, randomly stored, the woman was freed of linear chronology, any set piece for a life history and a purely verbalised description. The images did some of the work for both of us in ways which adjectives and other vocabulary could not supply. (1994:51[in Pink, 2002])

I noticed that even a single drawing can act in ways similar to the box of photographs. As a non-linear text the image seemed to free the child to talk

about those aspects of the drawing that were of importance to them as they were perceived or recalled rather than demanding to be fit together in a long singular verbal construction. As a teacher, I was likewise free to select aspects of the image I was curious about and, with the drawing as a point of reference, I was able to dialogue with the child about the meaning they were trying to convey.

I had a similarly freeing experience when I engaged in visual research. As a site for simultaneous thinking the visual image allowed me to see connections within images and between images and events that other methods seemed to hide from me. Emme, in a call for more visuality in the academy, also talks about simultaneity. He cites Soja,

> (he) is not arguing for some form of replacement of chronologic knowing with spatial knowing; instead, he is suggesting that the experience of simultaneity that is at the foundation of both physical and conceptual spatiality is an additional aspect of our experience that needs both theoretical and pragmatic attention. (1999, p. 36)

Visual displays played an important role in my classroom. My understanding of display was grounded in a recent interest in documentation of children's learning that derived from the visual exhibits, The Hundred Languages of Children (Glenbow Museum Calgary, 1997). This travelling exhibit has generated much discussion and emulation in the field of early childhood education. Teachers and researchers at the Reggio Emilia schools in Northern Italy, where these exhibits were constructed, were interested in arranging children's representations of their world in ways that document their learning. Photography was used to describe the contexts in which the learning took place.

In my classroom, displays of children's work, along with photographs of them working, told stories of the learning that had taken place for the children in this class. They were used to help the children share their learning with their peers, their families, and visitors to their room. Constructing these displays helped the children reconstruct the story of their learning. They told the viewer a lot about my values and about what the children, who helped with the construction, also valued. They not only told the story of the learning they also told about who we were and how we perceived ourselves in this context. In a similar way, the children constructed their individual learning stories through the selection and presentation of the visual artefacts in their portfolios. The children shared these individually assembled learning stories with their families on parent evenings. I noticed that the children have many different criteria for assembling their collections. Just as the aged dipped into their boxes of photographs to retrieve the memories these images elicited, so too these children could be seen to remember significant learning memories when reviewing their portfolios. While these different forms of presentation go some way towards acknowledging the multivocality of the classroom it is always a challenge to acknowledge the voice of each individual in classrooms.

The presentation of my visual data contains some of the elements I have just described. It tells a story of the children's learning, my learning, and reflects my perception of events in that context. My visual presentation is an attempt to move away from the traditional ethnographic practice of translating the images

into a singular text. While the context of this study does demand a written form, the writing was designed to complement the visual. I bring an academic discourse from current issues in the field of early childhood to the reading of the images with the understanding that there are other academic disciplines that could focus on those images different. As Pink suggests, "the images can be thought of as icons in which a range of different meanings may be invested" (Pink, 2002, p. 100). Each viewer will bring their own set of meanings and construct their own interpretation of the images.

While my visual presentation is a loosely constructed chronological narrative, this particular narrative did not present itself until I had reviewed the visual data several times after the event. I used the construction of a visually linear sequence knowing that while this was my construction and would not necessarily reflect the way it was experienced by the children, the familiarity of temporal order might help the viewer navigate through a complex series of visual images. The ordering of the images also helps to situate the images temporally and spatially within the research process and provides cognitive hooks on which to hang to my analysis. I feel that this chronological order more closely represents the lived experiences of the classroom than if I had grouped the images in a schematic or a thematic way. Just as there were many ways in which I revisited Jenn's drawings, so too there were many ways I could have ordered the images in this study. Each would have depended on my intention. As I present visual images in novel ways, placing new demands on the viewer, I am

aware that I have a responsibility to assist the viewers' access to these images. It is for this reason that I have placed supplementary text with the images. I struggled to resolve the tension that occurred as I worked to be true to the visual process while at the same time honouring my academic responsibility to present an interpretative text.

Video

There are a few publications that discuss video in ethnography. Collier and Collier (1986) discuss the advantages of video compared to film for cost and time effectiveness. It is only very recently that the potential for the use of video as a part of the ethnographic process has been considered (Lomax & Casey, 1998).

The distinctions that have been drawn between "objective" footage and "creative" footage (Banks, 1992) in film have carried over into the discussion of video. Some suggest that objective, or research, footage remain in its raw form to be accessed as a replica of reality (Barbash & Taylor, 1997; Collier & Collier, 1986; Heider, 1976). Pink (2002) argues that such distinctions limit the potential for video as an ethnographic tool. She points out that, "research footage is inevitably 'constructed'"(2002) and that ethnographic knowledge emerges out of the experience of field work, the particular perspective the ethnographer brings to the experience, and how the footage is incorporated into the study. Pink calls for a broader definition of video ethnography that would include many different genres like home movies, informant's footage, and self-representations. I see

interdisciplinary collaborations between Fine Art and ethnography opening possibilities for the use of video in ethnography. I am thinking of some of the work of artists such as Suzanne Lacy (1987, 1998) that involve collaborative, conceptual representations of social conditions that often include the media and documentary. Many of Tony Ousler's (1996) projective, reframed images invite new ways of looking at both video and images. My own studio work also explored the use of video in different ways (Brooks, 2001).

Smaller cameras and technological advances have increased the potential for video in ethnography. Small cameras with built in screens mean that the camera no longer obscures the face and allows the operator to see what is happening outside of the frame. In the classroom this was a great advantage to me because I could hang the camera around my neck or rest it on my lap and carry on a face to face conversation with children. I could simultaneously see what was happening on the screen and in the room. The small screen allowed me to review footage in the classroom either with a small group of children, my research assistant, or by myself.

As a teacher/researcher with young children it is difficult to take notes while teaching and it is also sometimes difficult to remember what happened in retrospect. Video footage contained a more complete picture than my hastily scribbled field notes. It also contained much more peripheral information about the contexts in which drawing occurred. Video allowed me to include myself in

the picture, which enabled me to study the interactions between the children and myself during drawing events.

The video portion of my research is a representation of an event that I had experienced and participated in. However, "visual materials are rarely used in isolation from other methods and correspondingly, visual materials should be analysed in relation to other research text" (Pink, 2002). In order to sharpen the focus of my analysis I have selected the specifically defined terms of a Vygotskian, social constructionist perspective. This perspective derives from contemporary early childhood education theory, practice, and discourse. I used this perspective to guide my editing and presentation decisions.

I believe that the process of collecting, reviewing, analysing, and representing video has as much rigor as "wrestling with the text" (Ricoeur, 1991) and as much transformative potential as a more text-based method. Video data can be reviewed and edited into small chunks that tell a story. Reviewing and editing these chunks take as much consideration as do textual write-ups. Each viewing is open to new interpretations. Layers of meaning emerge, overlap, and accumulate just as happens when text is revisited and rewritten. In the same way as we read text differently the second time around[6] so too does re-viewing video at different points in time bring different readings. What was in focus on the first viewing may not be the focus of the subsequent viewings. These changes in

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[6] Nielsen H. B., *Seductive Texts With Serious Intentions.* Educational Researcher.

focus and attention can open new doors to seeing what at first was not visible and bring a new level of understanding and raise new questions.

Organizing and reorganizing chunks of video footage into a believable story demands as much rigor as the craft of writing and rewriting. The process, like writing, is recursive and generative. Even small chunks of video hold large amounts of information, more than we can see in one viewing. I feel reviewing raw video footage is perhaps more exhausting due to the cognitive overload inherent in video images. The visual description is dense with gestures, expressions, sounds, light, and ambience. There is a multisensory feeling of being there. However, as I viewed the video data I was aware that I still only had part of the picture. As the teacher, I was aware of the other stories that continued beyond the camera's lens.

The two media, text and video, are engaged with differently and as such construct different meanings or understanding[7] (Gaskell, Fleming, Fountain, & Ojelel, 1999). The medium of text follows a more temporal and linear path. Expressions and tones are dependant on a certain competency and fluency with text. While video tends to have a similar temporal structure it involves reading visual images and sound tracks simultaneously, and interpreting not only a more comprehensive range of gestures and expressions but also all the variations of intonation and the information this carries (Goldman-Segall, 1998). Text, through the more precise labelling of ideas, narrows the view to more closely fit that of

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[7] Gaskell, J., Fleming, R., Fountain, R., & Ojelel, A., "Socioscientific Issues," in *BC Assessment of Science Technical Report 111* (Victoria:Ministry of Education 1991). They describe some of the differences between viewing and reading.

the author. Visual images require a more holistic and interpretative reading and offer more possibilities for multiple readings. Images are simultaneously multi-layered and open to multiple points of entry and travel (Prosser, 1998). Visual images presented through a digital environment add additional complexity.

To illustrate more clearly what I mean I have taken a sample from my written field notes:

> Brandon arrived at school this morning with a large and heavy flashlight. Before he took his coat off he started to tell me about it. "Look," he says enthusiastically, "It has a switch that makes the light brighter. Now we'll be able to see the book we're reading." I sat down on a nearby chair and helped him hold the flashlight while he showed me how it worked. His younger brother, who was carrying his backpack for him, stood beside him watching his every move and listening intently. His mom tried to gently get him out of his coat without disturbing the conversation he was having with me. I asked him how he wanted to share the flashlight with his peers. He wanted to put it on a table to draw the switches and later also have Andrea read with the flashlight to see if she liked that light better than the candle she had used previously. Two of his friends arrived and came in close for a better look at what he had brought. "What is this thing for?" asks one of them, wiggling the metal bracket that the flashlight stood on when put on the ground. "That's so that you don't need to always hold the flashlight," replied Brandon.

This ten minute exchange is a partial record of what happened on a particular morning. It has already gone through a process of editing and transformation. It begins to give the reader a sense of "being there" that good ethnographic notes should, however there are many aspects that remain inaccessible. The view is already limited by my editing. I have already selected the pieces of the exchange that I feel are important. I have not told you whether Brandon walked in or came in a wheelchair, nor whether he frowned or smiled at his peers' questions, or if he easily allowed them access to his flashlight. I didn't

tell you all the aspects of the flashlight Brandon shared with me and the rest of our conversation. You don't yet know why he might have brought the flashlight or how I, as teacher, feel about this. Already I am author and have made the decisions as to what information I will share with you. Your view is narrowed to my perspective. I only talk about the things I want you to notice. However, you also bring your own experiences and understanding to the text and perhaps already infuse the reading with your own interpretation.

I believe small chunks of video might be more inclusive of the viewer because, even though they are edited, they offer more raw information. The editing and presentation of the video clips will still tell my story, however if the video clips are viewed before reading my interpretation there is more possibility of a genuine conversation taking place between the viewer and the author. If I take just one still image from a video clip (see figure #2 below) it provides the viewer with multiple layers for interpretation and a spatial orientation.

Figure 5 Drawing the flashlight.

You are now able to see the size of the flashlight in relation to the child, as well as some of its special features. You are able to scan the image for other information that might give clues about the context. For example, there are three children sitting around a round table. This could suggest a social context for learning. The absence of the teacher implies that she might value independence. and trust the children can work well together without her direct instruction. The table has been stocked with a range of easily accessible materials and supplies that are communal and shared. This could further support the suggestion that this teacher values collaborative learning as well as initiative and independent thinking.

Working in a hypermedia environment, if I highlight (or hotspot) certain areas of the image for further explanation I am able to draw your attention to aspects that you might have missed. For example, if I highlight the drawing that Ed is working on I can draw your attention to the fact that he is making a representation of the flashlight on the table. I can further link this to a finished copy of his drawing to show some of the details he was interested in studying. If I highlight the flashlight I can link you to a video clip of the child who brought the flashlight and his explanation of how it works. This is the digital equivalent of the transcription and rewriting process in traditional ethnography in that the author focuses the reader but the surplus information that is a feature of lens images is retained.

By presenting the data in this more complete form, I have given the viewer access to the original data from which my theories were constructed. This brings

a level of transparency and helps address the reflexivity[8] that is demanded of more qualitative studies. By presenting my edited story I helped the viewer navigate through a more visual reading of the data. Good pictures, like good novels, not only invite the viewer in but also allow spaces for the viewer to bring personal experiences to the reading. My editing process has tried to support this sense of reciprocity that is inherent in visual readings. While you see my point of view and hear my story I have tried to leave openings that invite your point of view.

Goldman-Segall (1996) opens the question of validity in relation to video by asking us, "Is there a difference between validity and point of view?" (p. 22). She suggests that one's point of view influences the ability to "believe" what we see. If there is a certain congruence of point of view, or system of belief between the producer and the viewer, then the document(ary) (in this case video) will seem more credible.

An argument could be made for the author/producer to clearly state, or make more accessible, his or her point of view. However, this acknowledgement of subjectivity, while seeming to address issues of regulation of the distance between self and other, could, in fact, be counterproductive and run the risk of

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[8] Prosser, J. (1998), The Status of Image Based Research (p. 104), in *Image Based Research: A Sourcebook for Qualitative Researchers.* Prosser suggests that a high level of reflexivity might be required to validate more visually based research. Validity, he points out, has tended to focus on methods and he makes a case for relative ease of access to visual texts and representations as a way to address validity.

alienating the knower from the known[9]. Perhaps as Lous Heshusius (1994) suggests, just as there may be no procedural objectivity neither is there a procedural subjectivity with which to guide the research process.

Digital video media forms, as developed by Ricki Goldman-Segall[10], hold the promise that they, "have the power to share our points of viewing and the construction of our artefacts with readers while we are in the process of interpreting what we understand of any given moment in time" (1996, p. 24). When these same data are shared with other participants for their interpretation, the viewing becomes multi-dimensional and interactive. Sharing points of view will often change subsequent viewing. Video data are open to many viewings and many interpretations and for those who like neat categories and definitive answers this might be perceived as a disadvantage. I perceive it as reflective of the complexity of working with young children.

Goldman-Segall's book and website, Points of Viewing Children's Thinking, has underpinned much of the work in this study. I attended a three-day workshop with her to learn first hand about her work and methods. Her research institute, MERLIN[11], at the University of British Columbia, pioneers some of the most innovative, media-rich research tools. I relied heavily on Goldman-Segall's

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[9] Lous Heshusius suggests that "the management of subjectivity and objectivity are seen as sharing the same alienated mode of consciousness that believes in the possibility of a regulated distance between self and other." Heshusius, L. (1994), Freeing ourselves from Objectivity: Managing Subjectivity or Turning Toward a Participatory Mode of Consciousness? *Educational Researcher 23, No. 3, 15-22.*

[10] Goldman-Segall, R., (1996), Points of Viewing Children's Thinking: A Digital Ethnographers Journey. Visit her web site for examples of her use of video. http://www.pointsofviewing.com

[11] MERLIN is the Multimedia Ethnographic Research Lab at the University of British Columbia. http://www.merlin.ubc.ca

accounts of digital ethnography to guide the methodology for my data collection, editing, and presentation. I have used video as one of the primary formats for data collection. Like Goldman-Segall, who provides her audience with a written analysis of the data and makes her focus clear, I have also made my perspective and reading of the data quite explicit. However, there are some significant differences between her accounts and what I did during my project. Goldman-Segall's concern was to invite analyses and interpretations of children's thinking from multiple points of viewing. She makes her data accessible to an unrestricted audience as well as inviting different interpretations. While I invite different interpretations, I have restricted my participatory audience to those immediately involved in the study. Goldman-Segall was interested in many aspects of children's thinking in relation to technology. Using a Vygotskian, social constructionist perspective for my analysis has restricted my analysis and others' reading of the data and has given this study a tighter focus. Goldman-Segall uses a data based system called Constellations[12] for analysing her video data or works with her team at MERLIN to develop customized hypermedia interfaces. Mine is a much smaller and more contained study. I did not generate the large quantities of data she did, nor did I have a large group of people analysing the data with me. For these reasons I have chosen not to use Constellations to help me with the analysis. To assist me with some of the more technical aspects, for

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[12] For more information about Constellations visit the MERLIN website at the University of British Columbia. http://www.merlin.ubc.ca. See also, Ricki Goldman-Segall, Interpreting Video Data: Introducing a Significant Measure to Layer Description, *Journal for Educational Multimedia and Hypermedia 2, no. 3 (1993): 261-282*

example video streaming and Flash, I sought the advice and help of a web master[13] and personnel in the media lab at the University of Alberta.

Using the Video Camera in the Classroom

I cannot remember teaching without a video camera in my classroom. I persuaded the administrators at the first school I taught in to buy a video camera and it lived mostly in my room. Back then it was a large and heavy VHS Panasonic camera and I used it to record and review my own teaching. I would set it up in the corner of the room, or focus on a particular area, and just let it run. At the end of the day I would take the tape home and review what had happened.

Teaching in Kindergarten involved me in many spontaneous events; particularly play events. It was a very busy and intense environment and I could not easily step aside to reflect while teaching. Reviewing the videotapes helped me to better understand some of the complexity of my situation and allowed me to notice important details that I might have missed during my focused involvement. Through stimulated recall[14] while reviewing the video of play events, I became aware of patterns of behaviour and how some children were more successful than others at entering and maintaining play. I felt this information allowed me to help children become more successful participants.

The children grew accustomed to the camera in the room and became aware of its potential for them. I could record a block structure for them before it

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[13] I have collaborated with a webmaster, Connie Hilditch, on the presentation of my data. Connie is a Masters student in media based learning.

[14] Tuckwell, Neil B.,(1980)*Stimulated recall : theoretical perspectives and practical and technical considerations.* Centre for Research in Teaching, Faculty of Education, University of Alberta. Stimulated recall has been used as a data collection and analysis methodology.

was taken down or puppet play they had created for them to view later. We took the video camera on field visits and relived the experience when we returned to the classroom. I also used it to record some of the highlights of the work the children were doing and shared this with their families at parent evenings. It was not only appreciated by the children but also families. Sometimes I asked a parent volunteer to record children working together on a particular project. I remember one parent, after spending an hour video taping a small group of children building a farm together, coming to me in great excitement. "They are not just playing you know, they are really working. You should have seen . . . ." This same parent earlier in the year had taken me to task for allowing too much play and for not having all the children sit down and learn their ABCs. This use of video helped to involve the families in their children's learning, create focus and a forum for discussion about teaching and learning, and to build a sense of community in my classroom.

The prior success and insight with videotaping my class encouraged me to also ask the administration at my next school for a video camera. When I began teaching at the Child Study Centre at the University of Alberta, I again asked for a video camera and used it in similar ways. By the time I began teaching Grade 1 a few years ago, the video camera had become much smaller and easier to handle and I was now able to teach the children how to use it. The Grade 1 children in this study had a video camera in their classroom and they became quite competent at using it and quite discerning about their own camera work.

The children's interest in cameras influenced the selection of the topic of Cameras for a more in-depth study by them. Familiarity with this tool sensitised them to the etiquette of taping and being taped. While the children did not take any of the footage for this study, they learned they could invite the camera into their space. Sometimes it was only a subtle movement to make a space for the camera as if to include a third person. They also directed the taping by suggesting different shots and sometimes they liked to give a commentary on their work. They treated the camera as if it were an extra person, one who was intensely interested in what they were doing and who would give them their undivided attention. It seemed natural for the camera person to talk with the child while they were taping and the child, knowingly, would often talk back to the camera. They also learned that if they did not want to be videotaped they could say so or they would just move out of view. And yes, they were sometimes off task for the camera too.

I feel that neither the camera nor the Masters student who helped record the video were intrusive in the process of data collection. When I started to collect data for this study the video camera was a familiar tool to the children. The Masters student who helped me collect the video footage was also familiar to the children. She had just undertaken a study of her own in my classroom and had worked with, and built a relationship with, many of the children.

My aim when video taping was not to make an artistic documentary. I have no illusions about the roughness of my camera work. I was more interested in representing the essence of what was happening than smoothly zooming in

and out and capturing photogenic shots. Some of the most useful pieces of footage in my research are sometimes badly lit and wobbly. I was not concerned about holding the viewers' interest by varying the shots, as I was more interested in following a significant sequence of events however long and possibly boring to the outsider. My one regret is that I was not able to afford a better microphone because some of the dialogue is difficult to hear. I used a Canon Optura mini DV camera with its own built in microphone. The non-linear digital editing was done on Final Cut Pro on a Mac G333 computer. Digital editing influenced my editing process in several ways. I was able to take very rough cuts and edit them several times without worrying about loss of quality. I was able to group and regroup the cuts in files on my computer and call any of them up very quickly. I could also discard any of them at the click of a button. At any stage I was able to store these cuts on CDs until I needed them. I also had the original mini tape which I could return to, to pull different cuts from at any time. This allowed me to be open to which cut might best represent a point. I could eliminate surplus data from any part of the cut so that a more concise record was achieved. I could access these cuts in a non-linear manner and more easily compare events from different times in the study. Digital editing provided me with more flexibility so that my editing decisions were driven more by my search for examples that spoke to the research than by video quality or technical considerations.

As the technology and software involved in digital video is getting much cheaper and easier to use I see great potential for its use in classrooms and as a research tool.

The following images provide a small example of one way I could process the data.

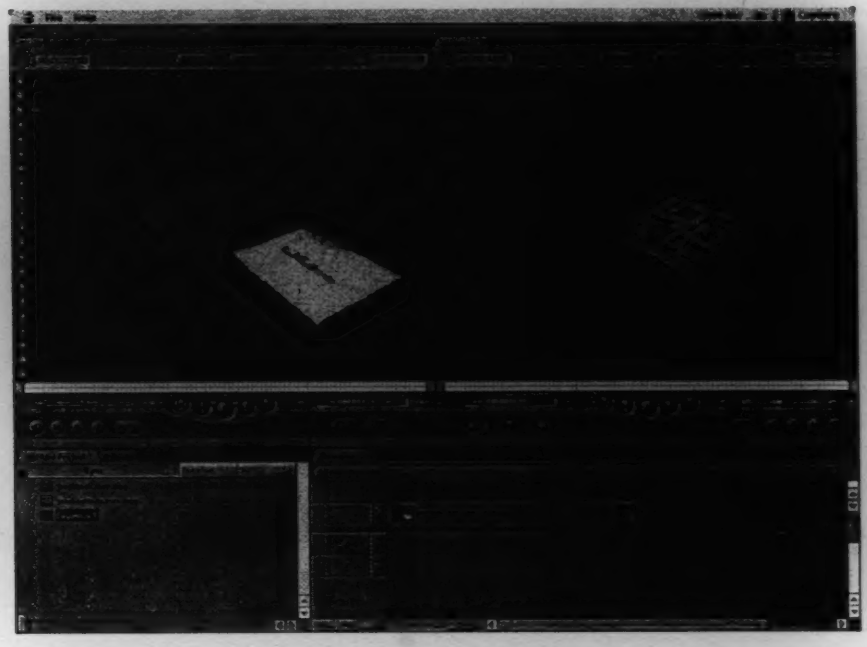

Figure 6 Editing window in Final Cut Pro.

This image was captured from an editing screen in the computer program Final Cut Pro. The window on the top left is where I capture and edit individual clips of footage from the mini DV tape. These clips can be stored in a file on the hard drive or a CD and accessed from the window in the bottom left of the screen. I can take any of these clips and place them in any kind of sequence in the window at the bottom right of the screen. When rendered they form a new composited clip. These clips are compressed for easier storage.

When I have a collection of clips I can open them up simultaneously on the desktop and view and compare them. Each clip has a play, pause, and rewind control on it that allows for easier viewing. I can also open any of the

drawings the children were working on and look at them in relation to the clip, or context, in which they were drawn. This accessibility of images along with the capability of juxtaposing images and clips in a non linear manner allowed me to make connections that I might not otherwise have seen. Each time I grouped and regrouped images and clips new connections were made across the images. Watching clips, or even parts of clips, several times over often uncovered subtleties and meanings that I might have missed in the classroom.

Figure 7 A section of my computer screen showing three video clips placed for comparison.

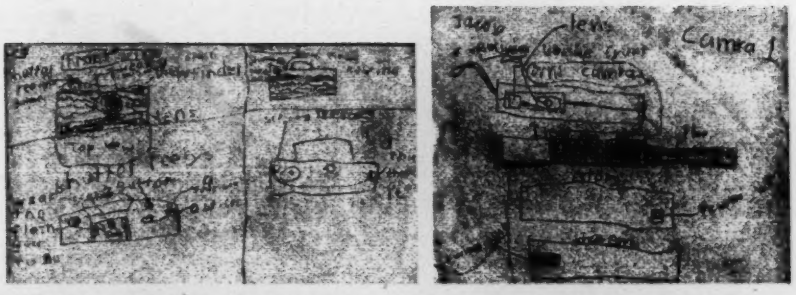

Figure 8 The drawings the two boys in the video clips were working on.

Deciding what to Videotape

Broadly stated, what I wanted to videotape seemed simple: I wanted to record as many drawing events as possible during one specific hour of each day that was set aside for project work[15]. It was during this time that drawing was most likely to occur. What was more difficult was not only defining what I meant by drawing but also, with many drawing events occurring simultaneously, how to decide which drawing event might be more important.

Like Merleau-Ponty (1989) I consider it a mistake to view children's drawings as abortive or frustrated attempts at more adult-like representations. I was not looking for examples that might fit under the label of "art," although some of the drawings might indeed have aesthetic qualities. I was bringing a Vygotskian, social constructionist perspective to the process of drawing. In this study I wanted to focus on drawing that had the potential to show the relationship between thought and drawing. I wanted to look at the context(s) in which the drawing occurred as well as the drawings. Two important distinguishing features

of my approach is the absence of any talk about aesthetic issues combined with a focus on drawing as a means rather than an end. When I refer to "children drawing" I mean both the drawing process and the drawing produced. Over the years, my classroom observations of children drawing have shown me that the children often use graphic marks to represent their ideas and to support their thinking. This kind of drawing happens in formal and informal contexts. It can be invited or occur spontaneously. These marks can recur and evolve as the child's thinking changes and they range from basic to elaborate. They can include a wide range of media, anything that leaves a mark. I am interested in how these marks help children make sense of their world.

Deciding which drawing events were important was more intuitive. Although my student assistant and I met regularly to discuss the data collection and plan who might be likely children to follow, we found we often had to change our plans and take advantage of unforeseen opportunities. Sometimes we followed a productive lead and other times we came to a dead end. When we found a child with an interesting question and a disposition to draw then the data we collected by following his or her activities seemed to yield more examples of the connections between drawing and thinking than the more random or one off drawing events. However, it was only really with hindsight that we were able to see this. We did notice that some children were more predisposed to draw than others were. The children's own needs and interests generated most of the

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[15] "A Project is the in-depth study of a particular topic that one or more children undertake." Katz, L. G., & Chard, S. C. (1991) Engaging Children's Minds: The Project Approach. It is a more

drawing events. However, I did initiate some of the drawing events. For example, the observation drawing of the flashlights and the cameras was something I modelled and encouraged. However, there was never an expectation that every child in the class would do an observation drawing, nor did they. While there were class discussions around some of the drawings produced (see CD) I tried to focus the discussion on the meaning that the child was trying to convey. There was never a class lesson where drawing was formally taught. Assistance with drawing problems and techniques was given on an individual basis as the need arose, however it was done more to help the child move forward with his or her thinking than to teach any representational or rendering skills.

Collecting the actual drawings was relatively easy as I either scanned them at the end of the day or looked through the children's portfolios at the end of the study. Sometimes drawings went missing. When this happened I was often able to extract a still from the video footage.

Deciding how to Edit

After three months of videotaping drawing events during project work I had about 15 hours of raw footage. Throughout the three months the student assistant and I would review the tapes on a daily basis to ensure that we had some footage we thought might be useful. We discussed some of the drawing events and possible directions to watch out for or to follow. These discussions and decisions could be viewed as a form of pre-editing. By the time it came to

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organic model of curriculum that begins with children's interests and follows a more collaborative and negotiated course than teacher driven models.

edit the video I had a pretty clear idea of what was there. With only 15 hours of time coded tape I did not have much difficulty finding pieces, so it was not necessary for me to find ways to tag the footage or chunks of edited tape as Goldman-Segall describes (1996, p. 117).

I gathered several clips of video around a theme. My theme headings related to the topic that the children were studying at that time, i.e. Flashlights, Light traps, Shadows, and Cameras. To make it easier for the viewer to follow I threaded the edited video clips together in visual narrative, or story within the same theme headings. One child, Ed, had featured prominently in the raw footage and I had a well documented record of his journey of discovery across the three months of data collection. Ed's drawing events, which were also grouped together under topic headings, provided me with a structural framework through which to present my data and analysis. I hoped this structural framework might make it easier for the viewer to navigate through the many pieces of digital data.

Some of the more technical considerations also affected my editing decisions, the main one being the download time of video clips if I were to put them on a web site. This forced me to be very careful to choose only the most critical incidents and further pare them down to the most essential moment so that I would have clips of no more than 10 megabytes. Even so, when compared to a more textual quote these clips might be considered to be lightly edited and

perhaps hold more verisimilitude than a text fragment[16]. Further compressing these clips reduced the size of the video image. This meant I could fit several video clips on one screen, which was helpful for both comparative and sequential reasons. The viewer has the option of whether to download the video clip or not. I have placed a still image on the screen that is often representative of the content of the video it is linked to or that I discuss.

By presenting the viewer with some of my data[17] I invite him or her to bring personal perspectives to the data and to participate in the discussion with me.

Hypermedia[18]

Traditionally ethnographic research has been presented as a textual document. Images and film, when they have been included, have tended to illustrate or support the text (Prosser & Banks, 1996). However, visual artefacts were often the source from which the text was developed. By allowing the viewers access to some of the source data, they are offered the possibility of closely examining original data. Such transparency and reflexivity establishes a

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[16] Walker, R. & Lewis, R., (1998) Media Convergence and Social Research: The Hathaway project. Walker and Lewis provide an example of video ethnography and hypermedia presentation in their description of The Hathaway Project. They point out that textual quotes are, "carefully framed and cropped and the reader is left to fill-in paralinguistic and prosodic features, to guess at the pretext and the context to the text as it is quoted and to trust the researcher not to have misunderstood, misinterpreted or cheated." (p. 165, in Prosser, J. (1998), Image-based Research: A Sourcebook for Qualitative Researchers. Falmer Press;London)

[17] Miles and Huberman (1984) suggest the rigor of systematic design and sampling as an antidote to cognitive bias. Also that documentation should exist for every interpretation of the preceding text level. One might view this as a call to subject qualitative methodology to a more quantitative approach, the assumption being that the rigor is not evident in qualitative approaches.

[18] I use the term Hypermedia in much the same way as the term hypertext is used. "Media" refers to the drawings, the photographs, the video clips, the texts, and the diagrams. "Hyper" refers to the fact that many of these media are linked and interactive.

strong foundation upon which an informed discussion in relation to both the artefacts and their analyses can take place. In the field of ethnography and anthropology there are a number of hypermedia sites that allow researchers access to repositories of data. For example, the Haddon Project (http://www.bodley.ox.ac.uk/isca/haddon/HADD_home.html) at the University of Oxford is an online catalogue of archival ethnographic film footage. Online ethnographic resources such as http://www.lucy.ac.uk, are where other researchers' projects, sites, articles, photographs, and documentaries are creating communities where discussions can take place and offer a different example of an ethnographic hypermedia environment.

Hypermedia presentations usually consist of sets of interlinked files that might contain text, diagrams, photographs, drawings, music, and video in any combination. Viewers navigate through these interlinkages by activating the links. In this way, hypermedia could be considered interactive. It has the potential for establishing a new relationship between authors and readers (Howard, 1988).

Hypermedia has the potential to make available a variety of different artefacts from an ethnographic study that might not easily be available in a more traditional presentation. Hypermedia also has the potential of making the process of ethnography visible to the reader as it unfolds. While ethnography as a discipline has not yet fully embraced the full potential of hypermedia as an environment there are a few different examples of how it has been used so far. A good example of these possibilities can be found at Lyon's live web site. This site

was developed while Lyons was engaged in Ph.D. study in Pakistan. He used the site to publish his ongoing field notes and research activities. He was able to include a wide range of photographs, music, and other artefacts from his study (http://anthropology.ac.uk/Bhalot). Now that his study is complete, he has left it up on the site as an artefact that can be revisited for other purposes.

In the field of Education, Goldman-Segall developed an ethnographic hypermedia site that also originated in her Ph.D. studies (www.pointsofviewing.com). "The notion of points of viewing encompasses where we are located in time and space, as well as how our combination of gender identities, classes, races, and cultures situates our understanding of what we see and what we validate" (Goldman-Segall, 1998, p. 4). She believes that we want to see how others see what we see as well as the things they see that we do not. It is in this process of exchange and dialogue of multiple points of view that she believes we come to a better understanding of the events in our lives. Her digital video explorations of the thinking of junior high school children can be explored on this site. The site was also designed to collect the thinking and points of view of anyone who cares to contribute. Goldman-Segall's hypermedia site provides us with a different example of an interactive, multivocal, ethnographic process and presentation.

Drawing events that are visual and time-based, as well as a visual analysis of images and video, beg a visual format for presentation and hypermedia seems to be well equipped to facilitate this. Images can be placed

strategically, independently, linked, sequenced, highlighted, or edited in ways that encourage a readings of the data that are less dependent on text and more inclusive of visual images and video data. I have used hypermedia to present the video data, images, and text for this study. Hypermedia facilitated the storage of, and access to, multiple images, drawings, video clips, sound recordings, and texts. It also allowed me to position the visual image in front of the text thus preferencing the visual for a more visual reading and interpretation. A multi-sensory representation was possible. Hyperlinks also allow access to peripheral information through other links. Most importantly a hypermedia environment that is open to multiple interpretations and ways of viewing visual images is congruent with the social constructionist perspective that guides both my teaching and my analysis of my data. It was the best way I could find to represent both the content and the process of my research.

Providing access to a quantity of visual, audio, and textual data immerses viewers in the research process in ways that might empower them to take a more active and critical approach to their viewing. It invites them to join the discussion and form their own analysis of the data. Strathearn (1991) highlights the rationale and benefits of doing this when she discusses the limitations of traditional textual authorship and analysis. To illustrate her point she takes a particular cultural event and constructs multiple interpretations and analyses of it to demonstrate the, often huge, range of interpretations possible but not usually acknowledged or discussed. For an author to write about many interpretations in one text might

be cumbersome and confusing. I see hypermedia as a way of inviting multiple points of viewing with others, and in this way opening up possibilities for different perspectives. It is one way to retain the complexity of the data as well as provide a forum for a discussion that can include multiple perspectives.

The non-linear environment of hypermedia allows users multiple points of access as well as choices of routes they might travel through the data. When viewers enter a hypermedia environment the menu from which they choose contains the whole array of content to be navigated both as the author designs or as the viewer wishes. The opportunity to skip around within the data is facilitated by the hyperlinking of the images and will hopefully steer users to a more visual reading and allow readers to build connections among images. I feel that building connections and constructing personal meaning in this way has some congruence with the way in which the data has been collected and analysed. However, the influence of the author or designer will always be there.

As a hypermedia process allows viewers to form their own and different interpretation of the data, they are then able to act like ethnographers and become immersed in the data, survey the contents, and form their own conclusions. I am not suggesting the process would be the same as the one I was engaged in. However, it could hold enough similarities to allow, "the potential to move beyond the process of 'describing' culture and into the realm of 'experiencing' the culture" (Anderson, 1999). Just as a well-written text has the possibility of drawing readers in, my hope is that a well-presented visual

environment might also draw viewers in. If my textual analysis is only available to viewers through a specific link when they are ready to download and read it this may allow space for a more engaged, interpretive, and critical reading of the images.

My goal is not to relinquish any responsibility of authorship but rather to invite the possibility for multiple points of viewing. As Goldman-Segall (1998) suggests,

> Ethnography in the postmodern era of the Net has to include the multiple voices of those with whom we work and play - voices that are heard in a context of gender, ethnic, and power relations - as well as the voices of those who view our artefacts. (p. 37)

In the context of this study, the participants are limited to a small invited group. However, extended forums offer many possibilities for the co-construction of knowledge about teaching and learning.

Classroom cultures are complex and in continual evolution. No matter how reflexive or in-depth the study, when it is bound in text or film it still brings a static quality to the subject and subjects. When a study is presented in a hypermedia format, with an ongoing forum for discussion and other interpretations, this static quality is transcended and traditional concepts of authorship are challenged. Hypermedia has the potential to, "address some of the most pertinent and current debates about the process of representing ethnographic subjects; equalizing the relationship between subject and author, the ability to feature a variety of writing and filming styles, the formulation of polyvocal representations .

. ." (Anderson, 1999, p. 13). While I realize that the full potential for an ongoing discussion is limited in this study, the possibilities that a hypermedia environment presents for more interdisciplinary collaboration in the field of early childhood are worth pursuing.

The inclusion of a variety of media accommodates different approaches to reading the study. Hypermedia allows those viewers who like to have an overview first to surf their way quickly through the site, while also allowing access to a more in-depth reading for those who prefer to navigate this way. Viewers will have greater access to more visual data than I might be able to provide in a paper document. PDF files allow the viewer to print out the text, which can then be read in the comfort of an armchair to relieve the strain of reading from a screen.

Hypermedia enables me to include peripheral information like brief descriptions of my educational and cultural background, my own art making as well as links to other influences and information related to my research. This additional information will aid in contexualizing my interest and approach to the subject. I am also freer to use multiple genres that might otherwise seem incongruous in a single text format.

Hypermedia also comes with its own limitations. One is the possibility of the viewer becoming disorientated and experiencing difficulty navigating through the links and pieces of data. Altleiter and Leutner (1996) suggest that if a user has many options and links but no clear plan of how they might direct their route

and what might be important elements then they are likely to become confused and frustrated. They also suggest that some prior knowledge of the subject greatly helps the user to navigate and figure out which pieces are important for their understanding. To assist me with design and user problems I have enlisted the advice and help of a graphic designer who is a Masters student in Educational Hypermedia Design. Working collaboratively with her helped me to better understand some of the difficulties users might have and how best to address them. However, ultimately the responsibility for authorship resides with me.

A Vygotskian Social Constructionist Perspective

This section outlines my perspective for analyzing the data. I begin with a brief summary of my interpretation of social constructionism followed by an introduction to Vygotsky in relation to his contemporaries. I then present four of Vygotsky's basic principles concerning learning and development that I use to analyze the data. I have illustrated these four principles with examples to show how connections might be made between a Vygotskian, social constructionist perspective and drawing. This perspective is congruent with my beliefs about teaching and learning and reflects the context in which the data was gathered.

Social constructionism is a term that is often used interchangeably with constructivism or social constructivism (Spivey, 1997). Constructivism, or cognitive constructivism, is usually most closely connected with the work of Jean Piaget (1932) and his followers (Anderson, 1995; Kintsch, 1998). One

distinguishing feature of constructivism is the belief that new knowledge is constructed internally, or metacognitively, with little or no influence from the social context. The term social constructivism, as it is used by Bruner (1986), and others (Garvey, 1986; Newman, Griffin & Cole, 1989), acknowledges the role the social plays in the construction of knowledge. However, the meaning of social in this context is usually restricted to the nature of the interactions between the novice and the expert.

Social constructionism extends the meaning of social to also include the cultural and historical aspects of the social contexts. "Constructionism . . . may be usefully understood as being about the way knowledge is constructed by, for, and between members of a discursively mediated community" (Hruby, 2001). However, as Hruby points out, this distinction is perhaps oversimplified.

Burr (1995) states that because social constructionism draws its influence from a number of different disciplines it is difficult to form a single definition for it. Instead, she offers four foundational assumptions under any one or more of which, social constructionism might fit. They are:

1. A critical stance towards taken for granted knowledge.
   This stance invites us to be critical of the idea that our observations of the world unproblematically yield its nature to us.
2. Historical and cultural specificity.
   The ways in which we commonly understand the world, the categories and concepts we use, are historically and culturally specific. Particular forms of knowledge in any culture are therefore artefacts of it that can display different ways of understanding.
3. Knowledge is sustained by social processes.
   People construct their knowledge of the world through their daily interactions with each other in the course of social life. Our current understanding of the world is a product of these interactions.
4. Knowledge and social action go together.

> There are numerous social constructions of the world, each different construction invites a different kind of action from human beings. These constructions sustain some patterns of social action and exclude others.

Duran and Syzmanski (1995), Bodrova and Leong (1996), and Wink and Putney (2002) link social constructionism with some of the more recent interpretations of Vygotskian theory.

Wink and Putney (2002) differentiate between the terms cognitive constructivist and social constructionist by looking at how these perspectives differ across various elements of classroom actions.

Here is a diagram showing their distinctions in terminology. As a teacher/researcher I found this construct helpful:

Construct	Cognitive constructivist Piaget	Social Constructionist Vygotsky
Knowledge	Changing body of knowledge, individually constructed in social world	Changing body of knowledge, mutually constructed with others
Learning	Active construction, restructuring prior knowledge. Multiple opportunities and diverse processes to connect to what is already known. Interaction with others and environment.	Collaborative construction of socially/culturally defined knowledge and values. Socially and culturally constructed opportunities, tying to students experience. Collaboration with others through social/cultural setting.
Teaching	Challenge thinking towards more complete understanding. (guide on the side)	Co-construct knowledge with students by sharing expertise and understanding. (actuator of learning)
Motivation	Self-development, competence.	Collective and individual development through collaboration.
Role of the teacher	Facilitator, guide.	Mediator, mentor, actuator.
Actions	Create opportunities for interacting with meaningful ideas, materials, others.	Construct with students' opportunities for interacting with meaningful ideas, materials and others.
Role of peers	Not necessarily encouraged, but can stimulate thinking, raise questions.	Assume part of knowledge construction, contribute to definition of knowledge, help define opportunities for learning.

Construct	Cognitive constructivist Piaget	Social Constructionist Vygotsky
Role of student	Active construction within mind.	Active thinker, explainer, interpreter, inquirer, active social participator.
Student view of self	Sense-maker, problem solver.	Sense-maker, problem solver, socially appropriate member of collective.
Evidence of learning	Process of inquiry. Performance: explanation of reasoning. Ongoing assessment.	Process of inquiry, socially competent participation in the collective. Performance: explanation of reasoning, social performance over multiple sites.
Purpose of school	Create new knowledge, learn strategies to continue learning.	Create new knowledge, learn strategies to continue learning. Prepare individuals as social members with expanding repertoires of appropriate ways of interacting.

(Adapted from Wink & Putney, 2002, p. 33)

Social constructionism can be seen to have its roots in Vygotsky's theories of teaching and learning. This interpretation resonates with my experiences and underlines its appropriateness for my study. Social constructionism has also provided a new perspective to children's growth and development that is becoming of interest to early childhood educators today (Berk, 1994; Berk & Winsler, 1995; Thompson, 1995; Bodrova & Leong, 1996; Bronfenbrenner, 1979, 1989, 1993; Edwards, Gandini, & Forman, 1998; Phillips, 1994; Topal & Gandini, 1999; Tobin, Wu, & Davidson, 1989). The inclusion of a Vygotskian approach also appears in a revised version of *Developmentally Appropriate Practice* (Bredekamp & Copple,1997), a position statement widely used by early childhood educators in North America.

Social constructionists' belief that, "the signs and symbols developed by a particular culture and the child's interaction in learning these symbols are

essential in developing . . . higher mental functions[19]" (Gredler, 1997, p. 13) also seems to connect well with my interest in studying children's drawing as a meaning-making tool. In any learning context the relationships between the social, the cultural, and the historical aspects inherent in forms of communication[20] combine to influence not just what is learned but also how it is learned. In a social constructionist learning context expertise is shared in order to negotiate and construct meaning. The learner brings prior knowledge and combines it with new knowledge through his or her interaction with others. Knowledge is co-constructed.

Past and present social interactions influence cognitive construction. For example, a child who has been involved in writing the grocery list, and selecting the items in the store will have a very different understanding of grocery shopping than a child who has been sat in the grocery cart and told not to touch while the adult shops. Cultural and social structures also influence the way we think. For example, Asian children who used an abacus had different concepts of number than children who did not (D'Ailly, 1992). The kind of logic we use and the methods we use to solve problems are influenced by our social and cultural experiences. Children acquire the rich body of knowledge accumulated by their culture which, in turn, influences their knowledge and thought processes.

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[19] Higher mental functions are, "cognitive processes unique to humans and acquired through learning and teaching. They are deliberate, mediated, internalized behaviors built upon lower mental functions. Examples are mediated perception, focused attention, deliberate memory, self-regulation, and other metacognitive processes" (Bodrova & Leong, 1996, p. 160).

[20] Forms of communication might include symbols, algebraic systems, art, writing, and diagrams and language (Vygotsky, 1962).

Vygotsky's theory of development has been referred to as a Cultural-Historical[21] theory. Vygotsky was perhaps one of the first psychologists to suggest the mechanisms by which culture becomes part of each person's nature. Vygotsky's developmental theory differs in significant ways from other theories of child development[22]. For example, while Vygotsky agreed that a child's development was a series of qualitative changes that could not be viewed merely as an expanding repertoire of skills and ideas, it was how he proposed the changes happened that differed from other psychologists of his time. For Piaget, a leading developmental psychologist and the father of constructivism[23], intellectual development had a universal nature independent of the child's cultural context. He proposed distinct and sequential stages with children reaching the highest level, formal operational thinking, around the age of 14 (Ginsberg & Opper, 1988). However for Vygotsky, the social and cultural context was of primary concern and it determined the type of cognitive processes that emerged. Vygotsky placed less emphasis on the characteristics of each stage of development and wrote primarily about the restructuring of the child's mind that

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[21] "Cultural/historical theory is a term coined by Vygotsky to emphasize the historical nature of his research and to contrast his approach to psycholinguistic research from research (phenotypic) that predicts or explains mental functioning. Vygotsky's research offers a way of understanding mental processes through disclosure of their emergence and subsequent growth" (Vygotsky, 1981, in Wink & Putney, (2002), A Vision of Vygotsky).

[22] "Development - is a revolutionary period of qualitative change" (Holzman, 1996). Learning and development are in dynamic reciprocal relationship and are thoroughly situated in culture. Development of the individual is "a process in which children grow into the intellectual life of those around them" (Vygotsky, 1978). It is a dialectical process, a "movement of movement . . . both continuous and discontinuous, as recursive but not circular" (Zebroski, 1994, in Wink & Putney (2002), A Vision of Vygotsky).

[23] "Construct" - is an idea or concept theoretically formed from different parts. "Constructivist" - the belief that children actively construct knowledge through their interactions with their environment.

takes place in the periods of transition from one stage to another. Piaget emphasized the child's interactions with physical objects in developing mature forms of thinking while Vygotsky emphasized the child's interactions with people. Both Piaget and Vygotsky believed that children are active in their acquisitions of knowledge, key elements in a constructivist theory, while psychologists from the behaviourist school at that time, like Skinner and Watson, viewed learning as determined primarily by external, or environmental, variables (Bodrova & Leong, 1996).

Central to Vygotsky's theory was the understanding that all phenomena be studied as processes in motion and change. Every phenomenon has its history and this history is characterized by qualitative and quantitative changes. Tracing qualitative changes in behaviour occurring in the course of development formed a bridge between the two dominant theories in child development of his time, natural scientific studies of elementary processes and speculative reflection on cultural forms of behaviour (Vygotsky, 1978).

Vygotsky believed that our life experiences affect and influence our development and learning. The social context influences learning and shapes how and what we think. From a Vygotskian perspective everything about learning and development is social. Hence the name social constructionism.

The following four basic principles underlying Vygotskian theories guided me in the analysis of my data:

1. Development cannot be separated from its social context.
2. Language plays a central role in mental development.

3. Children construct knowledge.

4. Learning can lead development.

While I recognize there will be overlaps, the first two principles will be discussed in separate sections, entitled The Social Context and Language and Thought, the last two principles will be combined in one section entitled Zone of Proximal Development. In each section I review my understanding of the principle and make reference to some of the ways it was helpful in my analysis of children's drawing.

The Social Context

Bodrova and Leong suggest three ways to consider Vygotsky's meaning of social context[24]:

1. The immediate interactive level, that is, the individual(s) the child is interacting with at the moment.
2. The structural level, which includes the social structures that influence the child such as the family and school.
3. The general cultural or social level, which includes features of society at large such as language, number systems and the use of technology. (1996, p. 9)

At an immediate interactive level there are two meanings for the social context. One is when we construct our understanding through our interactions with others. The other is more solitary. Vygotsky proposed that even when we are carrying out a mental action in isolation, we are not really participating in an individual mental process but are rather still operating in a social context. For example, we are using the social and cultural tools of language when reading a

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[24] Social Context – "Everything in the child's environment that has either been directly or indirectly influenced by culture. This includes people (e.g. parents teachers, peers) and materials (e.g. books, videos)." Bodrova & Leong, (1996), Tools of the Mind.

book, even when doing so alone. Books are themselves social, cultural, and historical artefacts. When reading a book we are constructing our interpretation of the text from our own experiential base that is itself determined by the cultural, social and historical context (Wink & Putney, 2002). I consider drawings to be artefacts that represent holistic reflections of experiential and cognitive knowledge grounded in a socio/cultural, historical, and political context.

Our interactions with social, cultural, and historical artefacts[25] shape the way we learn and develop and in turn shape the way we construct new artefacts. "Human beings are not limited by their biological inheritance . . . but are born into an environment that is shaped by the activities of previous generations" (Wells, 2000, p. 54). "We are part of the world in which we live and as such create our own path as we walk" (Friere, 1990). Vygotsky did not believe that there are many logical processes that are universal or culture free. The learner reflects the culture in which he or she is situated. "For Vygotsky, the human mind is the product of both human history or *phylogeny,* and a person's individual history, or *ontogeny*" (Bodrova & Leong, 1996, p. 10). For example, a Canadian friend who visited me in my hometown in England, with its winding streets and strange street names, was not able to use his familiar mapping skills because they were based on a grid system of street numbers. He had to relearn how to orient himself.

Vygotsky included visual representations in his list of culturally, socially, and historically produced artefacts. When I examine children's drawing I will bring

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[25] Vygotsky considered language, written texts, images and graphic symbols, and representations as being culturally, socially, and historically produced and as such artefacts that were a reflection or representative of the culture in which they were produced.

an understanding of the socio/cultural and historical contexts in which they are produced. Vygotsky also considered visual images, graphic symbols and models, plans, and maps as instrumental in mediating cognition. My analysis of children's drawing considers the mediating potential of drawing and drawings.

Vygotsky viewed learning and development as dialectical in nature. He saw them working together as a dynamic process in a socio/cultural/historical context. New mental processes exist first in shared[26] contexts before they are internalized and the learner is an active and interactive agent in his or her learning. For Vygotsky cognitive construction is always socially mediated. The social context is part of the developmental and learning process. Vera John-Steiner summarizes Vygotsky's socio/cultural/historical ideas well:

> Central to his approach is a view of the mind which extends beyond the "skull," which does not situate thinking in the confined spaces of the individual brain or mind. Instead, he proposes a sustained dynamic between other humans both present and past, book, the rest of our material and non material culture, and the individual engaged in symbolic activity. For Vygotsky, interaction with caregivers, peers, teachers and the material world is the basis of intellectual development. (John-Steiner, 1997, p. xviii)

In order to more clearly illustrate the potential for a Vygotskian, Social Constructionist analysis of drawing processes, I provide the following example of Jenn, in my Kindergarten class, who was studying the growth and development of a Painted Lady butterfly. I examine the situation in detail with particular reference to the three levels of social context and their relationship to drawing.

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[26] Vygotsky suggests that mental processes, such as memory or attention, exist between two or more people first before becoming internalized (Vygotsky, 1978).

Drawing The Growth and Development of Painted Lady Butterflies.

Background and Setting

My Kindergarten class was studying the growth and development of Painted Lady butterflies as they progressed from tiny caterpillars to larger ones, then chrysalis, finally emerging as butterflies. On one very large table I had placed pencils, crayons, small squares of drawing paper, resource books on caterpillars and butterflies, as well as the small plastic containers that held the food and the individual caterpillars we were going to study. Several children decided to adopt a caterpillar, observe, discuss, and represent its growth and development.

The learning environment for this group of Kindergarten children reflects the three levels of social context outlined by Bodrova and Leong (1996), briefly described below:

The immediate interactive level, that is, the individual(s) the child is interacting with at the moment.

In the Kindergarten class there is the social context of children grouped around a table in a classroom. They are interacting amongst themselves and with the text, the materials, and the adults in the room in relation to the caterpillars.

The structural level, which includes the social structures that influence the child such as the family and school.

Structurally the classroom is within a school, which itself is situated within the wider community surrounding it. Families are an integral part of the

functioning of the school as well as supporting and extending children's growth and development beyond school.

The general cultural or social level, which includes features of society at large such as language, number systems, and the use of technology.

The child, the classroom, and the school exist within a more global context and within a historical time line of local and wider educational theories and practices.

As I describe and analyze each of Jenn's drawings I will make reference to some or all of these three levels of social context.

The use of a large table containing a variety of materials and setting the social context for investigation were deliberate choices I made. I wanted to invite children to the table to share and discuss what they knew and thought about the growth and development of butterflies. I was also interested in how they might investigate and explore new questions and ideas. The drawings the children would make throughout this process would be records of these various discussions, ideas, and observations that could be revisited and re-examined individually and collectively as well as in different contexts.

My expectations for discussion, investigation, and representation for drawing within this context are grounded in my understanding and interpretation of social/cultural/historical and constructionist pedagogy. My interest in observing these children in this context is part of an ongoing investigation of how children learn that is part of my reflective practice. More specifically it is an investigation of how drawing contributes to their learning. Like Vygotsky, I believe that it is

necessary for me to not only observe individual children (ontogenic) but to also observe the social and material environment in which growth and development takes place (microgenic). This involves not only taking into account the life of the family, the classroom, and the school but also the cultural history within which these institutions are embedded and the more global context of human growth and development (phylogenic). I see learning as an, "artefact-mediated joint activity, which involves change and transformation of the participants and settings over time" (Wells, 2000, p. 60).

The selection of drawing materials I placed on the table for the children to use was also carefully planned. I chose blank white paper that was not too large so that it would allow two or more children to have enough room to work alongside each other. They would be able to share both concepts about caterpillars as well as drawing skills and concepts about drawing. I chose blank white paper because it allowed me to see the development of the children's ideas as well as how they might organize these on the page. I chose graphite pencils and colour pencil crayons because they allow the children to draw in more detail and with more control than tools like wax crayons and felt markers. Both erase fairly easily and allow the children to make adjustments. I put a few fine tipped colour felt markers on the table as well as file folders that served as portfolios for the children's work. I like the children's work to stay in the classroom rather than go home so that we can revisit, rework, recontextualize, review, and re-evaluate it.

In addition to the drawing materials on the table I added hand held magnifying glasses that I hoped would help the children focus on examining the caterpillars in more detail. I placed each tiny caterpillar in individual containers so that comparisons amongst the caterpillars could be made. The clear plastic containers, with the pre-crushed mulberry leaves for food, made looking at the caterpillars easier and the children could pick up the loosely sealed containers without contaminating the food or the caterpillars. The books I selected, and placed on the table, were chosen for the range of different kinds of drawings, photographs, and diagrams of butterflies and the various stages of growth and development of caterpillars they contained. I hoped they might offer a wide range of examples of different ways to represent ideas and information.

Jenn's First Drawing

Several children are gathered around the table to look at the caterpillars. Jenn has chosen to adopt a caterpillar and is completing her first drawing of it.

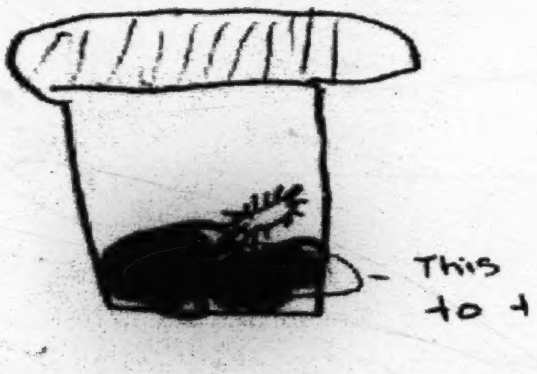

Figure 9 Jenn's first observational drawing.

In her drawing I can see that she has drawn the food with a graphite pencil and placed it at the bottom of the clear plastic container. She has managed to

show just how much food was actually in the container by only colouring to a certain level. The marks she uses to draw the food seem to convey the mashed up consistency of the leaves. Her line rendering of the container suggests that it is made of clear plastic while the ellipse of the lid suggests that it was round. I can see that Jenn has begun to adopt some of the visual conventions from her culture to help her convey what she is seeing. She has not made the lid circular as she knows it is but has rather adjusted the circle to the ellipse she can see.

Jenn seems particularly interested in the food the caterpillar eats. Her questions are about how the food was prepared and who put it in the container for the caterpillar. She wants to know how long this food will last and how much they eat each day. She makes reference to a mother caterpillar who might have left this food for the baby. She discusses her ideas with other children around the table and hears there are many different predictions and ideas about the caterpillar's food. In the reference books there are no clear cut answers to her questions but she seems intrigued that each species likes a different kind of leaf and that the butterfly knows which leaf to lay her eggs on. I let the children know that the food was sent in a container with the baby caterpillars and that the person who sent it knew the right kind of crushed leaves and just the right amount to feed the caterpillars. After we had discussed what the food was made of Jenn then added the green colour with felt marker. She also drew the caterpillar's head down eating it. The caterpillar was drawn bigger than it actually was, however the drawing showed me that she noticed that the many legs of the caterpillar were positioned along the whole length of the body. I wonder if her

questions about how much food the caterpillar needs perhaps came from her noticing that there is more food than caterpillar?

At the level of the individual, teacher, and child, Jenn brings her varied social and cultural experiences to the event. Jenn brings her own unique experiences, beliefs, assumptions, and values to the event. She also bring the beliefs, assumptions, and values of those she has had meaningful contact with throughout her life. She is a product of her cumulative past experiences. "Thinking, you see, denotes nothing less than the participation of all our previous experience in the resolution of a current problem" (Vygotsky, 1997, p. 175).

Vygotsky proposed that knowledge exists in a shared context before it is internalized. In this instance I saw that Jenn not only made her own drawing, but she also looked at the drawings of the other children as well as the images in the books. Vygotsky suggests that it is through language that we are able to construct new ideas and concepts. If I consider drawing to be a form of language as I have suggested, then in this context I saw her formulate and share her ideas about the caterpillar through her drawing. She saw other children's representations with suggestions and ideas that were not only different from her own but were also rendered in a different way. She also saw representations and information in the texts that were different again and she probably had to continue to reconstruct and adjust her original thinking to accommodate these new ideas. During this process it seems that Jenn has elaborated and transformed her understanding of the caterpillar's eating habits. In this context,

Jenn has been able to draw on multiple sources of assistance and through semiotically mediated "negotiation" she has created "a temporarily shared social world, a state of intersubjectivity" (Wertsch, 1985, p. 161). She has had to adapt and change some of her original thinking and ideas to accommodate the new ones. This is a transformative process that takes place in a social context. In this analysis of Jenn's first drawing I see examples of the first two levels of social context; the immediate interactive level and the structural level.

Jenn's Second Drawing (the Fat Caterpillar)

Three days later, before working on her next drawing of the caterpillar, Jenn re-examines her previous drawing in her portfolio. As she looks at her drawing she reviews aloud for herself her cumulative knowledge about the caterpillar. She uses her previous drawing as a point of reference that assists her review; she takes stock of what she has done and learned. This helps her with her comparison of the caterpillar's previous state with what it looks like now.

I hear from her comments that she notices the caterpillar is much bigger now. She also comments on a couple of tiny, black, hairy deposits in the container. The child sitting next to her has the same deposits in her container. Together they discuss what they might be. They then ask me what I think they are and together we all look at a reference book. The book tells the progressive story of the caterpillar's growth. Together we read that the caterpillar's skin does not stretch as it grows like our skin does and that caterpillars split and shed the old tight skin for a new one. Together we deduce that the deposits must be the

old skins. Jenn draws a fat caterpillar that she tells me is struggling out of it's skin while her peer draws what looks like the deposits of shed skin in her container.

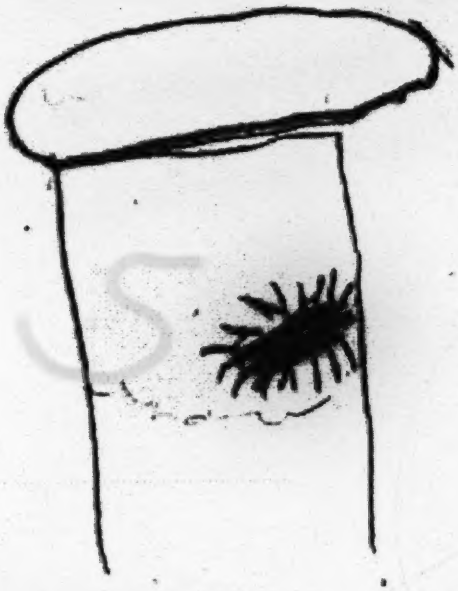

Figure 10 A fat caterpillar struggling out of its skin.

I notice that Jenn's caterpillar is drawn with lines that are more random and energetic and give a sense of the struggle of the caterpillar. The body of this caterpillar is coloured in black, perhaps in recognition that the skin deposits are black. In fact, the body of the caterpillar looks dark brown with a faint orange stripe. In this drawing the food is drawn in a less significant manner than the last drawing. This suggests to me that perhaps it is not so much the focus of her attention this time. She continues to use the same elliptical convention for drawing the lid.

In this context, I feel that these children are able to set personally significant and meaningful learning goals that acknowledge what each brings to

the context while also extending their understanding. In this way learning is not an end in itself but rather a way of participating in a social event to master new knowledge. The knowledge is not simply factual knowledge but is also knowledge that grows out of socially and personally meaningful explorations and questions that are formulated by and amongst the children. These real questions move the participants to pursue an answer, they encourage the disposition to wonder, hypothesize, and discuss. Some of the best questions arise from working on an activity. These questions are not formulated in the abstract at some predetermined point prior to the experience.

The analysis of Jenn's second drawing again shows examples of the first two levels of social context. Referencing a text that categorizes and presents information in a systematic manner brings in an example of the third level of social context. The reference books are an example of the general and wider level of cultural or context.

Jenn's Third Drawing

A few days later Jenn's caterpillar has crawled up to the lid of her container and spun a web around itself to secure itself while pupating. The chrysalis no longer looked like a caterpillar although what was inside the chrysalis would sometimes wriggle and move. At this stage there was much speculation on the part of the children as to what was happening. Jenn had also been watching and listening to some of the children try out new watercolour pencils with the teacher. Her preference up until now had been felt markers or graphite pencils. The novelty of the new pencils along with the different colours of

the chrysalis seemed to prompt Jenn to try out this new medium. She stood for a while longer watching how the other children used them. She watched carefully while some children wet the page first, then drew with the crayons. Others drew first, then put a wash over the crayon while still others dipped the crayon in the water like a brush and then drew with it. She asked each child why he or she did it that way. In her drawing she tried all three approaches (see figure 3).

Figure 11 Jenn's chrysalis.

In this drawing I can see that she was able to transfer some of the new information from her observations of others using watercolour crayons into her own repertoire. In this social interaction with her peers Jenn is interweaving the visual texts of others into her own visual text. This socially constructed intertextual transaction combines the understanding and practices of others in a new form in Jenn's drawing.

While the chrysalis were transforming we took the children to the butterfly house to see other species and to talk with an entomologist. This gave the children a chance to make some connections between what was happening in their classroom and what was happening in another context. In the butterfly house the children were able to see many different kinds of caterpillars, chrysalis, and butterflies. They were able to see differences, but perhaps more importantly they noticed the similarities amongst them. They noticed that while each caterpillar grew and developed in a similar series of stages they could take different amounts of time to complete the growth cycle. While each stage had similar features, each species had its own set of peculiarities. In this setting some of the species had samples of each stage of development. I felt that these comparative complexities again might challenge some of the assumptions Jenn had about caterpillars and butterflies and cause her to re-evaluate some of her thinking.

Many field sketch drawings were made to take back with us to compare and discuss. The field sketches the children made were similar to the field notes of ethnographers and anthropologists, and back in the classroom they were used in a similar way. As the children reviewed their field sketches they were able to remember more about their field visit because the sketches acted as prompts or mediators for memory. These memories could be shared amongst children and between the children and adults. This notion of a shared mental process is unique to Vygotsky and is different from a more traditional Western notion of memory which sees memory as something internal that only matures with age.

As the children and the teachers shared their stories about their visit to the butterfly house both teacher and child had access to more information than they might have had individually. The drawings served as tools for remembering while the discussion around the drawings acted to mediate retrieval of the memories from the drawings. The teacher's guidance of the discussion acts to elevate and extend the children's thinking.

The entomologist who talked with us not only added to the children's knowledge but also helped the children understand that there was a whole theoretical discipline attached to the study of butterflies that some people felt worthy of devoting their careers to. He also helped the children understand that care and preservation of nature was something we should all be concerned about and contribute to. Some of the children drew pictures of the entomologist as he talked and referred back to these pictures later to remind themselves of some of the things he said.

The visit to the butterfly house exposed the children to a more general cultural or societal level of social context. They had an opportunity to experience larger categories of butterflies as well as some of the professions and organizations concerned with butterflies and their habitats. The labels containing butterfly names introduced a whole new vocabulary, the Latin origins, and a scientific language that structured one's thinking about butterflies.

> Vygotsky did not believe that there are many logical processes that are universal or culture free. A child does not just become a thinker or problem solver: she becomes a special kind of thinker, rememberer, listener, and communicator that is a reflection of the social context . . . the cultural

> history of our ancestors' influences not just our knowledge but our very thought processes. (Bodrova & Leong, 1996)

This analysis of the third drawing and the field sketches done on the visit to the butterfly house contain examples of all three levels of social context.

Jenn's Fourth and Fifth Pictures

There was great excitement when our butterflies began to emerge. Jenn and the other children stood transfixed as they watched them struggle out of their chrysalis. We put the butterflies in a glass aquarium and kept them for several days so that the children could continue to watch them. Jenn did two more drawings.

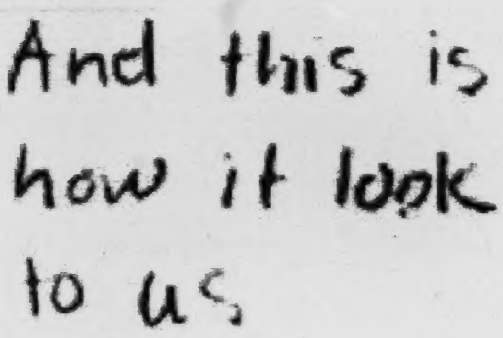

Figure 12 Jenn's drawing of how butterflies look to us.

Figure 13 Jenn's drawing of how butterflies look to other butterflies.

Apart from the almost exaggerated size difference the two drawings were identical, so I was led to believe that she drew the same butterfly from two different points of view, one close up and one farther away. It was only when she asked me to write the captions for her that I fully understood what she was trying to convey. One drawing is from the point of view of the child looking at the butterfly; the other drawing is from the point of view of the butterfly looking at other butterflies. I learned the value of entering into a conversation about the concept behind a drawing. I was surprised that she would consider points of view both visually as well as cognitively. I was also surprised that she would use the cultural convention of comparative size to effectively communicate her idea in her

drawings. I was reminded about our tendency to underestimate what children are capable of when it comes to drawing.

In these drawings I also noticed that the butterflies were facing the viewer. While this tends to be the way children of this age orient most subjects in their drawings, I wondered if there was some sense of reciprocity implied. I noticed that there was an anthropomorphization of the butterflies; they had very human-like faces. Perhaps if they have faces on them then they will also be able to take part in the conversation? At this point Jenn seemed to be showing her reflexive relationship with her audience. It illustrates that Jenn seems to have an awareness of other in the social context.

As well as providing an example of the extended notion of social at the immediate and structural level, the analysis of the two drawings helps to clarify the influence of the third level of social context. It provides a concrete example of a child's awareness and appropriation of a graphic convention that has been culturally constructed.

Jenn's Review and Reconstruction of Her Drawings

When we released the butterflies Jenn seemed to miss watching them. She took her portfolio of drawings and decided to make a small book out of them. It seemed to me that, in her own way, she might perhaps be trying to give some permanence to the event. In my classroom we often made books about memorable events and these then went into our class library. She laid out her drawings and then sequenced them. Then she made a title page and stapled the pages together and brought the book to me to read. As she finished reading she

looked at me in wide-eyed amazement as if discovering something for the very first time, and said, "Now I know what happens!" Jenn then dashed off to the writing table where she quickly recreated the elements of her book and again brought it to me. "This happens over and over again, doesn't it?" she said.

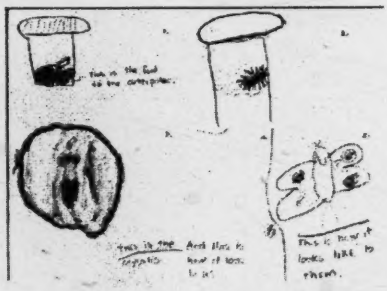

Figure 14 Drawings from Jenn's original book.

Figure 15 Drawings from the reconstructed book.

Jenn had not only physically ordered and put together the representations of what had occurred but she had also put together all of her prior knowledge and made a huge cognitive leap. She had, in her hand, a new socially, culturally, and historically created artefact that contained, for her, tangible evidence of the transformation of her thinking.

This incident was also a pivotal learning event for me. I realized that I had to take into account both an exploration of the historical and an over time relationship between and among texts and contexts when I am studying children's drawing.

This first principle, that development cannot be separated from its social context, gave me a way to analyze the social contexts of my data. It enabled me to see drawing as a socially, culturally, and historically mediated activity.

Language and Thought

"Rational, intentional conveying of experience and thought to others requires a mediating system, the prototype of which is human speech born of the need of intercourse during work" (Vygotsky, 1962, p. 6).

This section will outline the second basic principle underlying Vygotsky's theories, that language plays a central role in mental development. I will describe how it has provided me with another tool for analysing children's drawing.

While Vygotsky listed a range of mediation[27] tools such as symbols, algebraic systems, art, writing, and diagrams, oral language was the primary mediation tool on which he focused his studies. For Vygotsky language was a meaning-making tool that was uniquely human. While "language" is the word commonly used in translations, in fact many have suggested that "speech" might be a more accurate translation. Vygotsky proposes that it is in "word meaning" that thought and speech join to become verbal thought and that through the study of meaning-making we might find ways to understand children's thinking. He proposes that it is, "in meaning (that the) answers to our questions about the relationship between thought and speech can be found" (Vygotsky, 1962, p. 5).

Vygotsky began his analysis of word meaning by clarifying the need to study the relational properties between "word" and "meaning." He argued that if

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[27] Mediation is the use of an object or symbol to represent a specific behavior or another object in the environment. Wink & Putney, (2002), A Vision of Vygotsky. A mediator is, "Something that stands as an intermediary between the child and the environment and that facilitates a particular behavior. A mediator becomes a mental tool when the child incorporates it into her own activity. Examples are a string around the finger, a list, a rhyme and a clock face" (Bodrova & Leong, 1996).

each were studied as separate elements then there was little possibility of one coming to a better understanding of the development of thinking (1962, p. 4). He developed a new and different method, one that analyzed the "unit," i.e. word meaning, rather than the "elements," i.e. the word and the meaning. By "unit" he means "a product of analysis which, unlike elements, retains all the basic properties of the whole and which cannot be further subdivided without losing them" (1962, p. 5).

Vygotsky uses water as an analogy to explain further. When trying to discover why water puts out fire, a division of water into its elements of hydrogen and oxygen for further examination would not help solve the problem. Hydrogen burns and oxygen sustains fire. In this kind of analysis one is left to speculatively reconstruct the vanished properties of the whole.

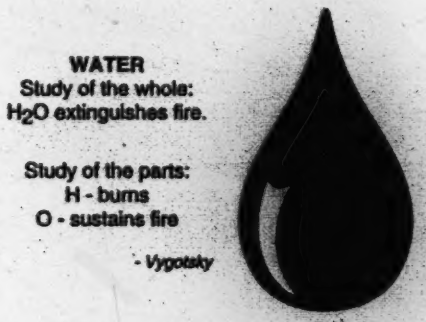

FIGURE 1 The Vygotskian Metaphor of Water.

Figure 16 The Vygotskian Metaphor of Water. (from Wink & Putney, 2002).

In my study of young children drawing I looked more closely at one particular mediation tool Vygotsky mentioned, one that has not as yet received much attention. I explored the notion that in drawing there may also be evidence of a relationship to thought and that this might also become visible through the study of meaning-making processes.

One might view a drawing as a unit which, when studied within the context of its' production, may yield some clues as to the connections between thought and action and the development of thinking. A drawing has the simultaneity of a unit in as much as all the information is contained in the whole and present at the same time. However, like language, drawing has suffered a similar history of elemental analysis. Curricular models for elementary art education retain the legacy of Victor Lowenfeld's (Creative and Mental Growth, 1947) instrumentalist art education, which draws heavily upon Piagetian developmentalism and may lock the child into an individualistic and sequential framework. We also have an internationalization and developmental categorization of images that are separated from their contexts as described by Kelogg (Analyzing Children's Art, 1969). More recently Discipline-Based art education has promoted an essentialist agenda that separates the elements of art. On a wider scale, the formalism of modernism and high modernism have left a lasting discourse that also supports an elemental approach.

Vygotsky wrote about two forms of meaning; meaning as reference and abstraction and meaning as contextualized personal sense (Wertsch, 2000). There are two basic assumptions about meaning as reference and abstractions. One is that, "Language meaning is a matter of referential relationships between signs and objects," and the other is that, " the development of meaning is a matter of increasing generalization and abstraction" (2000, p. 20). Vygotsky believed that an understanding of the difference between what he termed a child's spontaneous concept and a child's scientific concept depended on one's

understanding of these two assumptions. It is in the spontaneous concept, which occurs in a child's first encounters with an experience, that the referential use of language plays an important role. However, for meaning to develop further into abstraction the child has to move beyond this direct linking of referent to object to a more generalized meaning. Objects are grouped into categories rather than remaining single objects.

Vygotsky believed that a child's spontaneous concept differs from a child's scientific concept, particularly in the path the child takes in his or her thinking.

> The birth of the spontaneous concept is usually associated with the child's immediate encounter with things . . . In contrast, the birth of the scientific concept begins not with an immediate encounter with things, but with a mediated relation to the object. With the spontaneous concept the child moves from the thing to the concept. With the scientific concept, he is forced to follow the opposite path - from the concept to the thing. (Vygotsky, 1987, p. 219)

It is the referential nature of the relationship between the sign and the object that is the key to understanding the differences between everyday spontaneous concepts and more abstract, scientific concepts.

> The key difference . . . is a function of the presence or absence of a system. Concepts stand in a different relationship to the object when they exist outside a system than when they enter one. The relationship of the word "flower" to the object is completely different for the child who does not yet know the words rose, violet or lily than it is for the child who does. Outside a system, the only possible connections between concepts are those that exist between the objects themselves, that is, empirical connections . . . These relationships mediate the concept's relationship to the object through its relationship to other concepts. A different relationship between the concept and the object develops. Supraempirical connections between concepts become possible. (Vygotsky, 1987, p. 234)

Vygotsky also suggests that, "A word does not refer to a single object but to a group or class of objects. Each word is therefore already a generalization" (1962, p. 5).

A drawing seems to hold a similar generalizability. A drawing of a cup relates not only to that particular cup but also to all other cups that preceded it and to all others in relation to it. Drawing is used by young children not only to communicate ideas and thoughts but also to create a sense of meaning for themselves and for others. Vygotsky suggests that a "closer understanding of the development of understanding and communication in childhood, however, has led to the conclusion that real communication requires meaning - i.e. generalization" (Vygotsky, 1962, p. 6). He states that it is not enough to have labels for objects in order to think and solve problems, but what is also needed is an ability to manipulate these labels across contexts that will allow for connections that promote higher levels of thinking.

> True human communication presupposes a generalizing attitude, which is an advanced stage in the development of word meanings. The higher forms of human intercourse are possible only because man's thought reflects conceptualized actuality. That is why certain thoughts can not be communicated to children even if they are familiar with the necessary words. The adequately generalized concept that alone ensures full understanding may still be lacking. (Vygotsky, 1962, p. 7)

For example using the story of Jenn and her caterpillar drawings again:

When Jenn made the observational drawings of the growth and development of a caterpillar, its' chrysalis, and eventually the butterfly there was an assumption on my part throughout this process that Jenn knew what "life cycle" meant. It was a term that was used frequently in class conversation and

teaching. However, it was not until Jenn assembled her drawings into a sequence that she was able to fully understand the concept. She understood it well enough to be able to transfer the information into a different context and redraw the sequence from memory. She was able to show me how a caterpillar's life cycle was a recurring event. She was also able to understand that this cycle might sometimes be broken.

As a teacher I gave Jenn all the labels and words she needed to describe the process of a life cycle. However, her understanding could have remained at the level of recitation without any real understanding. It was through observation, dialogue, drawing, redrawing, and retelling of events that real understanding happened for Jenn. This is, I think, what Vygotsky means by his more contextualised and personal sense of meaning. It is in the formulation of ideas, or the expression of our ideas, that we can bring something more clearly into consciousness. His focus is on the activity of speaking, of finding adequate expression, that meaning is constructed. I am interested in the ways that drawing might help children to construct meaning and I think there may be parallels between Vygotsky's notion of language and thought and my notion of drawing and thought.

Having a word label for a concept is different from having had the experience of it. It is different to read and talk about the word "swim" or "hatching" than it is to do it or be there when it is happening. There is a difference between knowing about something and experiencing something. Some ideas appear to

take more processing than others do. It appears that the process of drawing can help with the processing of ideas.

The diagram below illustrates Vygotsky's theory of the connection between thought and speech and the development of verbal thought.

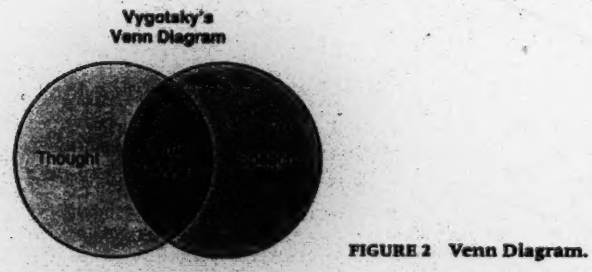

Figure 17 Verbal thought. (from Bodrova & Leong, 1996).

If we consider drawing to be a language of sorts then we can begin to consider how drawing might help with the formulation of thinking and meaning. The diagram below borrows Vygotsky's theory and illustrates the possible connection between thought and drawing and the development of visual thought.

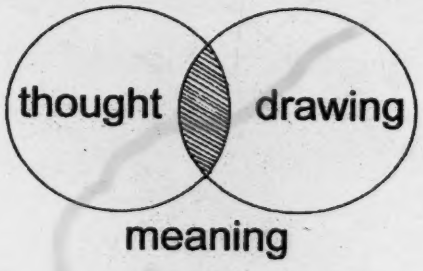

Figure 18 Visual thought.

In drawing, as in oral language, we can focus on what it is we are considering and through the formulation of a clearer description of what we are thinking come to better understanding of it. In addition, drawing could provide a bridge to thinking that may have some advantages over speech or writing.

> Thought does not consist of individual words like speech. I may want to express the thought that I saw a barefoot boy in a blue shirt running down the street today. I do not, however, see separately the boy, the shirt, the fact that the shirt was blue, the fact that the boy ran, the fact that the boy was without shoes. I see all this together in a unified act of thought. In speech, however, the thought is partitioned into separate words. Thought is always something whole, something with significantly greater extent and volume than the individual word. Over the course of several minutes, an orator frequently develops the same thought. This thought is contained in his mind as a whole. It does not rise step by step through separate units on the way his speech develops. What is contained simultaneously in thought unfolds sequentially in speech. Thought can be compared to a hovering cloud which gushes a shower of words . . . the transition from thought to speech is an extremely complex process which involves the partitioning of the thought and its' recreation in words. (Vygotsky, 1987, p. 281)

While the production of a drawing may have a temporal order to it which is similar to speech production, I feel there is a simultaneity in a completed drawing that very much parallels Vygotsky's description of thought. An image is seen as a whole. If we were to look at a drawn image of a barefoot boy in a blue shirt running down the street then all the parts of the drawing would be there simultaneously in the way he has described thought. Perhaps drawing more closely represents thought. Unlike oral speech, drawing leaves a more permanent record that can be shared again as well as revisited.

While Vygotsky drew upon two different and contradictory philosophical heritages, i.e. designative (objective/scientific, enlightenment) and expressive

(subjective, romantics), he did not see reason to prefer one over the other and instead allowed both to sit as different points of viewing word meaning (Wertsch, 2000). This multiple viewing or perspective sits comfortably with my own experience of how observational/representation and imaginative drawing can complement each other as well as how a drawing and the act of drawing can both contribute to meaning-making.

Extending Vygotsky's second principle, that language plays a central role in mental development, to include the notion that visual thought might also play a role in mental development, is a new and interesting idea that has added a different dimension to analyzing children's drawing.

The Zone of Proximal Development (ZPD)

The last two principles underlying Vygotsky's theories, children construct knowledge and learning can lead development, have influenced my perception of children drawing and are apparent when discussing his notion of zone of proximal development. Vygotsky described the zone of proximal development as follows:

> The distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (Vygotsky, 1978, p. 86)

Central to Vygotsky's theory of the ZPD was his understanding of the dynamic relationship between learning and development. Vygotsky believed that learning and development were interrelated and that learning and development were a reciprocal and dynamic process in which learning could often lead

development. This was a very different position from his peers, like Piaget, who believed that learning and development were two separate processes and that development had to occur before learning could take place.

Vygotsky recognized that children were able to solve problems that were beyond their actual developmental level when a more capable peer or adult guided or assisted them. The implications of this greatly changes and broadens the scope of what we have traditionally believed to be "developmentally appropriate." It challenges teachers to consider not only the child's current level of development but to also take into consideration emerging processes and skills and to look towards the child's future development. "What a child can do in co-operation today he can do alone tomorrow. Therefore the only good kind of instruction is that which marches ahead of development and leads it" (Vygotsky, 1986, p. 188).

The figure below illustrates this notion of ZPD. The ZPD is the zone between what a child can do independently and what a child can do with assistance.

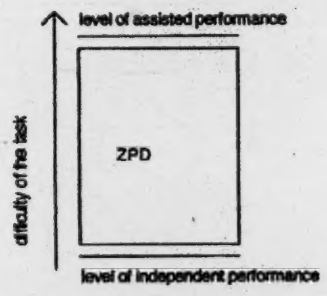

Figure 19 Zone of Proximal Development.

The whole range of the zone, as well as the difficulty of the task, needs to be taken into consideration when trying to determine the top and bottom levels of the ZPD. It is also important to remember that the assisted performance is the maximum that the child can do with help today and that this level is not limitless. Within each child there will be different levels of ZPDs in different developmental areas. Also, amongst children the ZPD will be different for different children.

The ZPD has implications for assessing what children know and can do. Teachers can no longer only consider what children can do independently, but also have to take into account what they can do with assistance. The nature of teaching and the role of teacher changes when the teaching and learning dialogues operating within the child's ZPD proceed ahead of development. The teacher becomes a co-constructor with the child and works with the child to clarify and extend his or her thinking. This opens the door for teachers to look beyond the dominant discourse of developmental psychology that suggests the teacher wait for a particular stage of development.

I used Vygotsky's notion of ZPD when I examined children's drawing processes. It helped me see drawing as a process in which I had a role to play. It implied that some sort of assistance may be necessary to extend children's drawing ideas; a similar co-construction where the medium for dialogue is visual rather than verbal. The ZPD suggests possibilities that move beyond the more traditional developmental theories from either Early Childhood or Art Education that tend to decide what children can do and when. I am more likely to see the

potential a child has if I am concentrating on the upper end of the ZPD rather than only on what they can do now independently.

Vygotsky believed that development begins as an interpersonal process of making-meaning before it becomes an individualized process of making sense. When a more competent other assists the novice in the ZPD, the dialogue and the learning exist in an interpersonal state. New knowledge exists first in a shared state, between the novice and the more competent other. Internalization only occurs when the novice is able to operate at an independent level or intrapersonal state. When operating at an intrapersonal level the child is able to converse with him or herself about what he or she knows. At this point in time the support of the expert in the ZPD is no longer needed. The nature of the interactions the teacher has with a child around a drawing event sets up explicit and implicit messages that influence the way the child perceives the drawing task and outcome as well as its' relationship to his or her learning and communication. Consideration of the concept of ZPD in relation to the teacher's or more competent peer's participation in children's drawing events was an important task in this research.

Vygotsky suggests that ideally the teacher should offer assistance at the top end of a child's ZPD in order to advance the child's development. Learning leads development and assists its' progress. He views the process as one that continually moves the ZPD forward. Vygotsky saw that when the top level of the ZPD had been reached it formed the foundation for the next level and the next

problem to be solved. It was a continuous, recursive process as the diagram suggests:

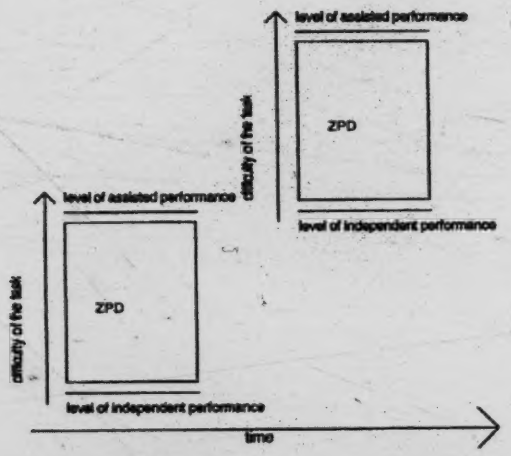

Figure 20 Recursive nature of the zone of proximal development.

The concept of the ZPD raises some interesting questions when the role of the teacher or the more competent other is considered in the context of children drawing. There has been some discussion about children's artistic development not falling into neat Piagetian stages (Kindler, 1997; Taunton & Colbert, 1984, 2000). There have also been some suggestions about different kind of stages (Taunton & Colbert, 1984, 2000). However, much of the discussion so far has retained a developmental paradigm that tends to ignore the context. This has provided inadequate guidance for knowing what support at the top end of the ZPD might look like for individual children in the context of their drawing. I am reminded here of Vygotsky's "water analogy" and his concerns about the limitations of elemental analysis. In drawing, when one concentrates on just one element, for example the product or the drawing, it is tempting to analyze it in isolation from the process and the context in which it was produced.

Vygotsky suggests that the focus should be on the whole and the relationship among the elements, specifically meaning-making. If our support in the drawing context concentrates on making meaning within the context of a particular drawing as opposed to the more traditional skill acquisition and production aspects of drawing, this might open up a new way of examining the role of the adult or more capable peer.

The concept of ZPD has been of great interest to many researchers, with the nature of the assistance that happens within the ZPD being of greatest interest. Researchers and psychologists like Zaporozhets (1986), Wood, Bruner, and Ross (1976), Newman, Griffin, and Cole (1989), Cazden (1981), Rogoff (1990), and Tharp and Gallimore (1988) have all developed their own ways of looking at and understanding what is happening within the zone.

Tharp and Gallimore (1988) extended the original definition of the ZPD to include a four stage recursive cycle:

> Stage 1. Performance is assisted by more capable others.
> Stage 2. Performance is assisted by self.
> Stage 3. Performance is developed, automatized, and "fossilized."
> Stage 4. De-automatization of performance leads to recursion back through the ZPD. (Tharp & Gallimore, 1988, p. 35)

While this model supports and expands Vygotsky's notion of the recursive cycle of the ZPD, the emphasis on performance could potentially run counter to learning goals. Performance implies there is a convergent goal that is the result of mastering a specific skill or concept. While performance can certainly be part of the drawing process, I am concerned that this emphasis on performance might detract from the meaning-making that can occur through drawing, and that it may

contribute to a more elemental approach to drawing. However, if I consider performance to be more open-ended and to involve such things as the ability to raise good questions and to solve problems, then some of these stages are more helpful. Among the strengths that drawing holds are its generative and divergent possibilities.

I am particularly interested in Thorpe and Gallimore's description of the four stages and their notion of "fossilization" or automation of performance. In my many observations of children drawing I have noticed that children will appropriate certain drawing conventions or solutions that work well in particular contexts. However, some of these solutions become automatized, or fossilized, and are then sometimes used thoughtlessly in situations where perhaps other solutions might be of more value to the meaning-making and communication process. De-automatization and recursion back through the stages, or a re-examination of the process could be helpful in moving children's drawing toward new and different ideas and solutions.

Zebroski (1994) created the metaphor of a tidal wave to illustrate the recursive movement of the ZPD. It is an image that not only includes the forward motion but also the regressive movement. The metaphor allows for a continuous building on past experiences and continuity. Vygotsky saw this backward movement, or seeming regression, as the time that foreshadowed the reorganization and restructuring of experience that prepares for the next developmental or conceptual leap forward. I suspect it will be challenging to recognize aspects of this metaphor when observing children's drawing processes

because much of this restructuring is all but invisible. However, I do recognize this as something that happens in drawing. It happens in my own drawing. Often when I am stuck and can only repeat old ideas, I recognize this as a form of regression and I am forced into a deeper reflection of the problem. Then I pull in new and different solutions that move me to the next level in both my understanding of the problem and appreciation of the solutions possible to me. Integral to this process is a dialogue I have with others about my drawing and my relationship with the drawing. Thorpe and Gallimore suggest this dialogue when describing their stages of progression. Uncovering what this dialogue with self and others looked like with children drawing was an important component of analyzing drawing processes.

Rogoff (1986, 1990) studied the nature of the interactions between mothers and toddlers as well as between weaving teachers and their apprentices in Mexico. She noted a much more responsive interaction between the more capable peer and the novice. The expert would break a task down to match the novice's ZPD, then would constantly adjust and renegotiate both the dialogue and the level of support within the ZPD. I have noticed that the task of drawing and representation is often overwhelming. I am aware however that the nature of the assistance we offer can limit as well as extend possibilities. Negotiating both the level and the nature of assistance with the novice using Rogoff's notion of responsiveness helped me when facilitating the child's expressing meaning through his or her drawing.

Cazden (1981) considered performance as coming before competence. She suggests that understanding will occur through doing the task. So long as the task is within the child's ZPD, with repetition the child will eventually understand. It is in the redoing and rethinking that progressive understanding occurs. It is almost like saying that sometimes we need more time to process things. It reminds me a little of Jenn when she was drawing her caterpillars almost every day. At the end of a series of drawings of her specific caterpillar her understanding of the caterpillar was far greater than at the beginning. Revisiting the task and the repetition of drawing the same caterpillar over again allowed Jenn to notice more things about her caterpillar than by doing only one drawing of the caterpillar. Redrawing the same thing also brought fluency to the drawing task that allowed her to look beyond the task of drawing and to use the drawing as a tool for understanding life cycles.

Newman, Griffin, and Cole (1989) describe the ZPD as the construction zone. It is where the dialogue between the teacher and child co-constructs a path to a deeper understanding. Malaguzzi (1993), the director of the Reggio Emilia schools in northern Italy, describes it as being like throwing a ball to a child in such a way as he or she will want to return it to you and want to continue to play. Knowledge is co-constructed by the child and the adult within the ZPD.

This is a strategy that teachers in Reggio Emilia have used with great success in supporting children's learning. It is one that I too have worked with in my own classroom after reading about Reggio teachers. The teacher and child work together to try to understand each other's thinking through a shared

dialogue. They work towards some action on the part of both the child and the teacher. In Reggio schools many of the dialogues are visual in nature and are invested in by the community through the inclusion of a resident art teacher, or atelierista, on the staff of each school. Reggio teachers view the child as rich in potential, competent, strong, powerful, and capable. This is a different perspective of the child from one that is driven by developmental stages and convergent curriculum goals. The dialogue one has with a "rich" child is different than one that views the child as deficient, lacking, or "poor." What is of interest to me is not only the idea of the child as a powerful and active agent in their learning, but also the contribution that drawing and visual representation can make as part of the dialogue.

Wood, Bruner, and Ross (1976) gave us the term "scaffolding." Scaffolding is a metaphor for the kind of support that is given within the ZPD. In this context the task is not altered or made easier but rather the level of support that is given is changed. The less capable the child the more support he or she is given. I have observed adults working with young children where they will place a tool in a child's hand and with their hand covering the child's they will guide the tool in the way it is typically used. This is accompanied by a verbal description of the action. As the child becomes more confident with the tool the adult will remove the hand but continue to give verbal guidance until the child no longer needs even that. The adult begins with maximum support for the learning and gradually removes the support as the child no longer needs it.

This example might compound the confusion that often occurs with the word scaffolding. It seems to suggest that the support is of a physical nature. However, if I return to the example of Jenn and her caterpillar drawings I can see evidence of some of the other characteristics of scaffolding that Wood, Bruner, and Ross refer to. The primary characteristic of scaffolding took the form of maintaining Jenn's interest in pursuing a goal. Jenn's ownership of her caterpillar and the responsibility she negotiated with me for its care likely helped to maintain her interest. Her goal was to record the growth and development of her caterpillar. The other recommendation, that adults or more capable peers focus on the meaning or the concept the child is trying achieve, has also happened. Our interactions have focused on the question, "What does the life cycle of a caterpillar look like?" The other characteristic is that as the child becomes more capable the responsibility for the performance is handed over to the child. When Jenn did her first drawing I gave her the paper and pencil, sat beside her, and modeled the process as well as talked aloud about what I was doing. When she did the later drawings I no longer needed to give her that support. In the beginning I supported her by giving her access to materials and encouraging her to use them, involving myself in the activity, and talking aloud about what I was doing. These strategies allowed for a more open-ended interpretation than if I had instructed her through a series of prescribed steps.

One of the implications I might be tempted to draw from working with the ZPD is that all assisted learning is good. However Moll (1990) warns us that this is not the case. He mentions that things like work sheets and rote drill-like

practices not only do not fit under Vygotsky's notion of ZPD but may also be counterproductive to it. I see the drawing equivalent being colouring sheets, colouring books, adult drawn templates, connect the dots, and recipe-like instructions.

Another point to consider is the notion of the more capable peer. Recent studies (Wheeler, 2000) looked at paired peers in relation to expert and novice relationships. They discovered that there is an optimum differential between developmental levels that will enable the growth and development of the novice. If the difference is too large then there is less likelihood of transfer of skills or concepts. When I worked with children and their drawing this was an important consideration. A peer may be more capable in one context or particular area than another may. How do we decide who is the more capable? Some children are more capable of supporting their peers than others. Pairing a more capable child with one I feel may be less capable does not guarantee that increased learning will occur.

Wink and Putney consider the issue of more capable peers in relation to Moll's "funds of knowledge." Moll used the idea of "funds of knowledge" to document and appreciate the many local but diverse and often essential skills and knowledge that are situated in families and communities but rarely acknowledged by teachers and schools and even more rarely actively encouraged as part of authentic classroom experiences and learning. Moll is suggesting our criteria for evaluating what constitutes more capable should be

carefully considered (Moll, 2000). In relation to drawing what constitutes more capable is an interesting question that is worthy of further exploration.

The notion of Zone of Proximal Development offers many challenges in relation to children drawing. It is difficult to determine the possible range of drawing competencies within the Zone and the nature of support that the teacher might offer in the context of drawing. A deeper understanding of the notion of leading activities and "developmental accomplishments" greatly assisted me in understanding drawing in the context of the ZPD. This final section takes a closer look at leading activities and developmental accomplishments and tries to find ways to link them to drawing. My hope is that linking drawing with leading activities might establish a new way of looking at drawing development and the range of accomplishments in drawing.

Developmental accomplishments are the outcomes of the interaction of the child and the social context for learning. Developmental accomplishments describe new cognitive formations. Developmental accomplishments are not components of a stage theory but rather a way to describe some of the behaviours that facilitate the growth of higher mental functions at particular periods of a child's development. As children develop new accomplishments and competencies the adults and others in the child's life adjust and increase their expectations of the child.

Vygotsky suggested that development included qualitative and quantitative changes. Qualitative changes involve a restructuring of the mind

while quantitative changes involve the amount of knowledge that is accumulated. He also suggested that learning leads development.

Leont'ev (1977/78) was one of Vygotsky's colleagues who extended and elaborated on Vygotsky's idea of learning leading development. Leont'ev used the concept of "leading activity" to specify the types of interactions between the child and the social environment that lead to developmental accomplishments. A leading activity is the only type of interaction that will:

1. produce major developmental accomplishments
2. provide the basis for other activities (interactions)
3. induce the creation of new mental processes and the restructuring of old ones.

> Children engage in many types of activities, but only the leading activity is crucial for the emergence of the next developmental accomplishment. When engaged in a leading activity, the child learns skills that make it possible for him to begin the transition to other types of interactions with the environment. Leading activities shape the mind in a unique way, enabling the child to generate new mental functions and to restructure current mental functions. Leading activities are the optimal activities for development. (Bodrova & Leong, 1996, p. 50)

Building on Vygotsky's theories Leont'ev and Elkonin proposed the following leading activities.

At the preschool stage, play is the leading activity with imagination, symbolic functioning, and integration of emotions and thinking being the developmental accomplishments. This stage overlaps with the primary grade stage. At the primary grade stage learning is the leading activity, with the beginning of theoretical reasoning, emergence of higher mental functions, and intrinsic motivation being the developmental accomplishments.

When I return to my example of Jenn and her drawings of the growth and development of butterflies, I can see how these drawings and the process of sequencing her original drawings and redrawing her original book also provide an example of major developmental accomplishment. The process of drawing led Jenn's development and induced the creation of new mental processes and the restructuring of old ones. Jenn's drawings were the leading activity that mediated between prior knowledge and the formation of new knowledge.

Grade 1 sits just at the boundary of preschool and the primary grades. For this reason I have included the preschool stage, play, in this study. Play continues to be an important activity in my classroom. By Grade 1 children's play has become very elaborate and focused. It is used by groups of children to explore, represent, and share ideas and concepts.

In play children are acting out real-life situations where they develop rules that move them beyond their current level of development.

> It is incorrect to conceive of play as activity without purpose . . . creating an imaginary situation can be regarded as a means of developing abstract thought. (Vygotsky, 1978, p. 103)

When a child takes on a pretend role they have to put themselves in place of the, typically absent, person they are representing. In this case they have to not only know about, but also conform to, the specific set of attributes of the person or scenario they are representing. Play supports contexts for recreation and an opportunity to try out different roles. Children can take a concept, story, or incident and modify it in the recreation. For example, three children working together to recreate a photography studio have to share their prior knowledge,

assign roles, follow certain sequential procedures, and conform to the collective notion of what a photography studio should be like. "Play contains all the developmental tendencies in a condensed form and is itself a major source of development" (Vygotsky, 1978, p. 102). Children also use drawing to facilitate a common understanding and to help plan out actions and ideas. Drawing then becomes a leading activity.

Vygotsky argues that in play children do not act any way they please. Each role imposes its own set of rules on children's behaviour. Play mediates between thought and action. This is a very different perspective on play than the traditional western perspective, which sees play as totally spontaneous and free of any constraints.

Bodrova and Leong (1996) have identified three particular ways in which play influences development:

1. play creates the child's zone of proximal development.
2. play facilitates the separation of thought from actions and objects.
3. play facilitates the development of self-regulation. (p. 126)

Returning to my example of the children recreating a photography studio I can see that drawing also facilitated the separation of thought from actions and the development of self-regulation.

Some major characteristics of play that prepare children for later learning activity include: symbolic representations and symbolic actions, complex interwoven themes, complex interwoven roles, and a time frame extended over several days. In play children use objects, actions, words, and people to represent something else. This symbolic functioning paves the way for later and

more complex uses of symbolic functioning like those specified in math. Imagination, which is an element of play, has a generative function. It allows children to experiment with new ideas and contexts. Drawing contains many of these elements of play and has the potential to be a leading activity, particularly if the child has to work with others in the group to explain, negotiate, and recreate. Drawing tends to be an open-ended and generative activity. It involves the use of the imagination as well as the use of symbolic representation. It generates the abstraction and decontextualization of specific events that have to be rendered in a two-dimensional form. The child has to extract salient points from the context and consider which ones to include in a drawing so that a reading might be possible. Drawings also have the flexibility of play in as much as the child can change or transform what they represent and how it is represented. Drawings can be done individually or collaboratively; they can be immediate responses or extend over time becoming more complex and multilayered. They can include artefacts, techniques, and materials that are borrowed from other contexts and integrated in new ways to give different meaning.

In my study, I look for evidence of drawing producing major developmental accomplishments, providing the basis for other activities (interactions), and inducing the creation of new mental processes and the restructuring of old ones. Evidence was sought which would highlight the role drawing can play as a leading activity.

Prior to writing the text version of the following chapter various analytical processes had already taken place. First were the choices I made as a teacher

when planning and negotiating the learning events in the classroom. Then came the decisions that were made about the data to videotape and collect. When everything was collected it was reviewed, sorted, and edited again to create the selection that you see on the web site (or CD). At each stage, I used the four research questions to guide me.

1. Development cannot be separated from its social context.
2. Language plays a central role in mental development.
3. Children construct knowledge.
4. Learning can lead development.

Chapter Four

Presentation and Analysis of the Data

Introduction to Analyses

This chapter presents the analysis of my data in a text format. In order to keep the temporal sense of story in the children's learning journey I have used an informative narrative style of writing. From time to time I have interjected links to the Vygotskian theories specified in the presentation of the theoretical background in Chapter Three.

The numbered screens on the side headings of this text indicate the screen on the web site that corresponds to the analysis. I have commented selectively on the drawings or clips presented for viewing.

Analysis of Ed's Flashlight Project

Examining Flashlights, Screen 1

In the first photograph there are two different flashlights on the table. The children have brought these from home because they wanted to test a variety of light sources that might be possible to read by. All three children are doing an observational[28] drawing of the flashlights. While the observational drawing was something I initiated and often modelled with the children, these children have chosen to draw and have chosen which flashlight they want to draw for their own particular reasons. The materials that are visible on the table, loose-leaf paper

and pots of pencils and pencil crayons, suggest collaborative use with open-ended possibilities. I discovered that I could learn a lot about children's thinking processes when they use blank paper and I can see how they have laid out their ideas on that space. I chose pencils and a wide range of coloured pencil crayons because I have also discovered that children of this age like to be able to include fine detail with the sharp points and to carefully select matching colours. These materials, laid out on a round table in the social context of a small group, are all things I deliberately structure as a teacher.

The social context for learning reflects my belief that knowledge is socially and culturally constructed. The choices I give children about where to work, who to work with, and how to formulate their ideas reflects my belief that children already know a great deal about the world in which they live and have the capacity and motivation to share this with others. Given a trusting and supportive environment, I also believe that they are able to make good choices, collaborate, and construct knowledge with their peers. Accountability for the choices they make is also built into the program. Further evidence of this collaborative and negotiated environment can be found in the video clips where you can hear children discussing ideas amongst themselves. My teaching assistant and I supported these discussions, however we also actively guided and made suggestions that worked to bring the class together as a cohesive learning community. This sometimes meant limiting children's choices or being selective

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[28]Observational drawing - I mean a drawing that is done with particular and direct reference to the

about which of their ideas we would adopt. The materials brought from home reflect my understanding that learning is not something that happens only within the context of the classroom. Finding opportunities to invite families and the community into the classroom to participate in projects is an important part of my practice.

The topic under investigation was "light" As the days grew longer and the clocks changed the children noticed these changes. To provide a contrast to light the children suggested that a very dark space be made in the classroom so that a comparison between very dark and light could be made. The piece of black plastic you see in the background of the image is the covering for this dark space. Children took the flashlights, and other light sources, into this dark space and were able to study how they lit the space. A candle gives out a very different light from a flashlight and some understanding of candlepower rating became evident. My adoption of the children's suggestion indicates that I valued their ideas and would help negotiate and construct learning opportunities with them.

Investigating light in the context of the classroom brought each child's personal experiences with light and dark into an arena where these more spontaneous concepts were extended to include more global or scientific concepts, for example, the notion of candlepower and the reasons for the clock and time changes. Most children would likely have used a flashlight but few may have taken the time to examine it closely. The children had many different ideas

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object being drawn.

about how flashlights work and why there was a range in the quality of light produced. However these cause and effect ideas tended to have a more spontaneous logical base. Bringing the many different ideas into the context of the classroom discussion and activities meant that these children were able to hear that others might have different or conflicting ideas. These differing ideas helped to raise the questions that provided the impetus for further investigation. Compiling and comparing observational drawings, as one of the children did, gave the other children a reference upon which to build and elaborate their ideas. Through shared reviewing, as well as discussions, the drawings prompted a deeper understanding of the differences amongst flashlights. Drawing was encouraged at every possible opportunity. Comparing flashlights against different criteria helped the children to group and categorize in more complex ways; ways that acknowledged the scope of the technology of the culture in which they live. The children in this class were encouraged to formulate good questions and to investigate these questions either in small groups or independently.

On the display board behind the children are the beginnings of a display of children's work. Placed beside the work samples are photographs of the context for the work. The children helped to assemble these displays and contributed pieces of work that told the story of their learning. They also helped to write captions that provided additional information about the images. These displays allowed children to see the different ideas their peers were working with as well as the different possibilities for representation. Taking part in the documentation

of their own learning helped them understand that the communication of ideas was important and that there were many ways to do this. Documenting their learning in this way also helped their parents and other visitors to their classroom to know about their ideas and discoveries. The children began to appreciate that the audience and the implications of their learning extended beyond the classroom and that other people were interested in the work they did.

The large flashlight on the table was on because the girl closest to it was drawing the light it gave out as well as the flashlight. The girl next to her was drawing the flashlight in front of her. It was also switched on occasionally so that she could see the light it shed. These two girls have just had a conversation about whether light can be a colour, and if so, what colour and under what conditions. This conversation initiated a three week long investigation that involved looking at rainbows, water, and prisms.

Ed had just finished examining the large red flashlight with another child. They discovered that this flashlight had three levels of light. Ed and his friend Blair, each had their own theory about how the three levels worked. Ed seemed intrigued by the switch of the large flashlight. He told me that he thought the light changes had something to do with the switches. His friend Blair told me that he thought it had more to do with some mechanism around the bulb. You can hear Blair's theory and see the light in action in the video clip. Ed set out to record his theory and the video clips describe his process.

Ed's Flashlight Drawing Process, Screen 1

In the first video clip of Ed he began by making a drawing of the flashlight with a plan view (a plan view is an overhead view). This was a different view from the one that he saw from where he was standing. Reflecting on his choice of a plan view I wondered how far ahead he was thinking and planning. I also wondered whether the comments made by Blair influenced his drawing choices. A plan view was the best view of the switches he was about to spend so much time on. Congruent with this perspective, the stand the flashlight rests on was drawn as if it went under the flashlight. He used the cultural convention of occlusion that he had likely seen in other drawings to assist him to establish his point of view. He drew the flashlight with the light on and brought his recent experience of observing it in the dark space into his drawing by colouring black, to represent darkness, all around the flashlight. I noticed that the manner in which he had represented the light was similar to the girl next to him. He had perhaps thought of her as expert and borrowed an idea from her. This borrowing, or sharing, of knowledge might be regarded as an example of knowledge existing in an interpersonal state before it exists in the intrapersonal state. When I reviewed this clip I noticed that Ed drew the light from the bulb in a rectangular enclosed space before he made a cover the same size to fit over this space. This led me to believe that he had probably already made a decision about having a cover. He drew the convex dome of the light with a line to represent transparency and included this in the uncoloured (undark) rectangle.

Ed's Flashlight Drawing Process, Screen 2

Ed took a coloured piece of paper and placed it over the drawing of the dome and the uncoloured square. He talked to me about the light looking as if it is off when the paper covers it and on when the paper is not covering it. I could see that he was likely thinking about how to represent the contrast between light and dark and the corresponding notion of on and off. Linking these two concepts moved him beyond a more immediate referent/object response. His drawing was more than a replica of what he saw. The process of drawing out his ideas and observations seemed to have moved him to a higher level of thinking. In this instance drawing seemed to have mediated between thought and action and provided a means for Ed to move to a level of abstraction that might not previously have been possible.

Ed's Flashlight Drawing Process, Screen 3

The third image is a video that shows him drawing his plan for attaching this piece of dark paper to his drawing. He told me he wanted to make a flap. By making a flap he was turning his two-dimensional drawing into a more three-dimensional working model. Attaching the paper flap to the drawing seemed to be a significant idea for Ed because he took the time to actually draw a diagram of how he would do this. He enclosed his drawn plan with a single line as if to signify a complete idea. Inside the enclosure he drew the piece of dark paper, a staple, and the paper his drawing was on. He labelled each of these and put an arrow from one to the other to indicate the order in which one might work. He

placed these drawings in a sequence that reads from left to right, the same direction as text is read. Ed likely encountered labelled diagrams, arrows as symbols for direction, as well as directionality of text in his environment and brought these ideas, or conventions, into his own representation.

After completing the flap and having several of his peers test it out Ed had another idea. This was probably sparked by a comment one of his peers made about the switch actually having three settings while his drawing only had one. Ed asked me for two pipe cleaners and disappeared off to the far end of the classroom. He assured me he did not need my help and unfortunately I was not able to follow him to record what he did. At the end of the class he brought me his drawing (see Ed's flashlight drawing). He had cut and coloured another piece of paper to represent the switch on the flashlight and had managed to staple the two pipe cleaners so that they would hold the switch in place while also allowing it to move back and forth like the switch on the flashlight did. Now he could synchronize the moving of the switch with the opening of the flap. I saw this drawing as a good example of drawing functioning as an activity that was leading Ed's development. Drawing the flashlight and plan for the flap acted as a basis for another activity that led to developmental accomplishments that eventually allowed him to solve the problem of how to construct a three-way switch. Ed seemed to me to have formed new cognitive pathways while drawing, pathways that allowed him to extend his thinking and move forward to solve other related problems. He extended his notion of on and off to include the notion of different

levels of "on." The impetus for moving his thinking forward was a question from a peer. The support lent to him by myself, the teacher, was as a sounding board and as a facilitator with space, time, and materials. My interactions with Ed were responsive and as well brought the focus of discussion around the drawing process to the intent of the drawing in the manner Rogoff suggests (Bodrova & Leong, 1996). Vygotsky (1978) suggests that it is not enough to have labels for objects in order to think and solve problems but what is also needed is the ability to manipulate these labels across contexts so that higher levels of thinking occur. I saw Zebroski's metaphor of the tidal wave happening with Ed and his drawing of the flashlight (Bodrova & Leong, 1996). To better represent on and off he was forced to bring in new ideas. These ideas allowed him to move forward in a way that would not have previously been possible. In this example, Ed's drawing processes extended themselves across contexts to allow him to solve a problem. Now, simultaneously in one drawing, Ed has access to multiple ideas, the notion of on and off, and the related concept of light and dark. It consolidated his idea of there being three positions for the switch that controlled the intensity of the light and the ability to synchronize these activities in a way that matched his understanding of how the light worked. Having this working model that clearly showed others what his theory was, he could then discuss his theory with others in ways that ensured a common understanding. The focus in this drawing has consistently been upon the meaning the drawing holds in the construction of new knowledge. Any attempts Ed made at likeness or verisimilitude seem to have

been to better understand the functioning of the flashlight, rather than to create a more accurate drawing. Restated, I could say that the lack of drawing skills did not seem to inhibit Ed's use of drawing as a meaning-making tool.

Analysis of Light Traps Section

Many children wanted to build light traps. I was not sure where the idea came from but it was one they took very seriously. Each day individual children, and groups of children, arrived at school with new plans for how to trap light. They drew elaborate plans at home and brought them to school. They discussed their ideas over lunch and during recess. Individual children and groups worked on the floor to enclose flashlights with unit blocks as well as build structures with unit blocks on the light table. They seemed to have formed a common agreement that all of the traps should be made from unit blocks. Unit blocks were a very familiar material for the children in this class and were used for exploring and representing many ideas. It seemed to me that the children used unit blocks as a three-dimensional thinking tool. Each day before leaving the classroom we gathered as a class and tested the traps by putting out the main lights, plunging the classroom into darkness. This way we could better see if light was escaping from any trap.

Ed's Light Traps

Screen 1

Ed was one of the first children to build a light trap. He chose to work by himself on the light table. Two other children worked next to him building their own trap. Ed began by drawing a plan for his trap. Drawing a plan before working

with unit blocks is something that I asked the children to do most of the time. It allowed me to see what they were planning to do and facilitated any collaborative work by giving participants a clearer idea of the goals they were working towards. It also gave me an opportunity to check that there was adequate space and materials for the number of children planning to use blocks. I could then facilitate where they might best place the structure, who might best be included in the group, and any other parameters.

Screens 4 and 5

After drawing his plan, Ed collected the blocks he thought he needed and took them to the light table. His drawing helped him make decisions about which blocks to choose and how many. His drawing mediated between thought and action to make his actions more deliberate. Without a drawing to guide them, some children tended to pull blocks from the shelves in a random and haphazard manner. For some projects, this more intuitive way of working might have been appropriate. However, I have found that drawing a working plan has helped children to organize their thinking as well as alert them to the mathematical properties, shapes, and sizes of the blocks. They also have to match them one to one with the drawing and aim for some equivalence when working from a drawing. This process helped the children become aware of the relationship between their ideas, their actions, and the outcomes. For example, when I asked a child who had not drawn a plan how many blocks they needed for their trap they tended to say, "I need a lot," and would collect huge amounts of randomly selected blocks.

When children worked from a drawn plan they had a better idea of how many blocks and which kind they would need. The process of having to draw the blocks seemed to help them become more aware of some of the decisions they would have to make for building. For example, a unit block could be placed flat with its largest surface area on the floor or it could be stood on any of its other sides. When the child was drawing the block plan, decisions like this seemed to receive more attention.

Ed had drawn one elevation plan of the longest side of his structure (see screen 2). I did not know if he had an idea about how he would build the short side. Ed methodically built his light-trap, constantly referring to his drawing to guide his building. It seemed important to him to build true to his drawing. Having the drawing to work from seemed to aid his concentration and focus, as the many things happening around him did not easily distract him. I saw Ed using his drawing as a reference point. It reminded him of his original idea. Ed's movement between referring to his plan and the building he was constructing displayed an understanding of the function of a plan. The act of working with a plan offered opportunities for Ed to gain a better understanding of the elements and use that could be included in a plan.

Ed's drawing also functioned as an abstraction of an idea he had about light traps. It was a two dimensional symbolic representation. Working between this two-dimensional image and his three-dimensional structure meant that he had many translations to accommodate between the reading of the symbols and the actions he had to perform. However, he was able to do this because the

drawing was meaningful to him. He also seemed to have an understanding that he has flexibility in how he interprets this working plan. When Nicole asked him if he had made any changes he told her that he had to build two layers of blocks to keep the light out more effectively. I also noticed that he had changed the kind of block he had planned to use on the side elevation.

Ed's drawing was specific to his understanding of light traps. It contained very personalized meaning. Within the context of the classroom, the other light traps and drawing plans he had seen had likely influenced Ed's drawing. His drawing also revealed some of the conventions that he had acquired from his viewing of plans and diagrams both in and out of school. I could see that he had oriented his page to best fit his drawing. He had placed the drawing on the bottom edge of the page (the edge closest to the viewer) so that the page edge acted as a foundation or anchor for his drawing. The fairly accurate proportions of the blocks clearly indicated which blocks he had in mind. He had drawn the blocks touching each other and sometimes had even shared the line between blocks. This indicated to me, and likely to him, just how snugly they must fit together to trap light.

When I reviewed the video clip of Ed, I became aware that he had put so much effort into the building that it seems he had not thought clearly about the light source. When he finished his building, he seemed a little perplexed that the light was still escaping from around the outside (of his building). It seemed to me that he was not sure if this also meant that light was escaping from his building. I noticed that he could see light shining through his paper when it was on the light

table. He flipped the paper up against the blocks and looked to see if he could see light coming through the blocks onto the paper from his building. I also watched with fascination as he built the other long side of his building. He referred not only to the drawing but also to the wall he had already built. I could see him doing a three-way check. I suspected this was to help him with the different perspective he had to take to build the second wall. He had to work in mirror image from his drawing, however he seemed to realize that the back of his first wall was the same as the mirror image. I have noticed young children display remarkable flexibility with visual orientations. In the background of this video clip, I heard children talking about mirrors and using mirrors in their light trap. Ed did not seem to be paying much attention. However, their work definitely made an impression on him because once he finished his light trap he spent about two days working with mirrors.

Mirrors

Ed's Exploration of Mirrors, Screens 1, 2, and 3

Ed was likely aware of the mirrors that the two boys next to him at the light table had been using. The next day Ed asked me if he and his friend could work with some mirrors. Together they rounded up as many mirrors as they could and placed them in many different positions in front of the large mirror in the dark space. They used the large red flashlight to see how its light would reflect in the mirrors. It was during this experimentation that Ed noticed that the flashlight had a mirror behind the bulb. This observation stimulated more work with mirrors the following day. They said wanted to see if they could trap light with mirrors. They

did not do any drawings while doing these experiments. As the teacher who was busy working with another group of children in another part of the classroom, I was disappointed that they did not make any drawings. I had no record or point of reference to revisit this event with the two children. I also had no way to share their work with others other than the oral sharing that took place at large group meetings.

Ed's Exploration of Mirrors, Screen 4

The next day Ed brought a small piece of tin foil from home. He wanted to draw another flashlight to show the mirror in it and he wanted to use the tin foil in his drawing. He chose the flashlight where he could most clearly see the mirror behind the bulb. He carefully cut the shape of foil to stick on to his drawing to represent the mirror. He said he thought the people who made the flashlight used such a big piece of mirror because the flashlight was small but it needed to have a light that was big enough to read by. In this drawing, Ed was showing me the connection he had made between his experimentation with mirrors and his work with flashlights. Connections between Ed's thinking, his experience, and his actions became visible in his drawing. The drawing represented new knowledge. This new knowledge was now accessible for him to revisit, reflect upon, and share with others through his drawings. When Ed shared his drawing with his peers they were able to add this to their understanding of flashlights and to share their similar observations with Ed, thus confirming for him that his idea was valid.

Stuart and Anton's Light Trap

Stuart and Anton's Light Trap, Screens 1 and 2

The two boys sat together to plan their light trap. Each made a drawing of what the light trap would look like. As they drew they talked with each other about their plans and looked at each other's drawing. The drawings allowed each child to see what the other was thinking. This facilitated a common understanding. It was also an example of knowledge existing in an interpersonal form, the medium of exchange being the drawings along with the related conversation. When I compared their drawings, there were basic similarities. Mirrors featured in their conversation from the very beginning. Both boys had noticed the mirror in the flashlight and seemed convinced that mirrors and light had to go together. Stuart said the mirror gave the light "more power." In the first drawing that Stuart did the mirror was placed under the drawbridge. His rationale was that any light that escaped from under the castle walls would be trapped in the mirror and bounced back down to where it came from. Light spillage from around the structures was a recurring problem for the children who worked on the light table. Anton seemed to be thinking more about the light trapped within the hollow towers. His drawing looked a bit more elaborate to me than Stuart's drawings. While Stuart laid down the foundational drawing he did more talking than Anton. In Anton's drawing there was a sense of three dimensionality in one tower where he has shaded one side darker. It seemed that Anton used Stuart's initial drawing as a model and elaborated on it. Anton's drawing showed two hollow towers. However, the light could only travel successfully up one tower because the other had windows in it.

Anton suggested that if the drawbridge were also hollow then the light would have to travel through it too. He reasoned that the light would then only be able to go up the tower, through the drawbridge and down the other tower. There would only be one path for the light to travel and it would not be able to go anywhere else. This new plan seemed at first to make the mirror redundant. Stuart suggested trying to incorporate the mirror in another way. The two boys discussed the necessity of the mirror. Stuart insisted that it was the mirror that made the light "bounce off" and keep moving. When Stuart mentioned "keep moving" Anton paused and suddenly seemed to understand the purpose of the mirror. Stuart suggested that if they placed the mirror strategically at one end of the drawbridge then the light would bounce off it and travel back across the drawbridge. In Anton's drawing you can see a record of the various trial placements of the mirror (screen. 4).

Unlike Ed's drawing, these drawings did not clearly show the blocks that would make up their structure. Stuart and Anton seemed much more interested in the path the light might travel and where to most effectively place the mirror. Drawing seemed to help them clarify their thinking about this. They were able to take some initial and tentative ideas about how to trap light and elaborate and extend them through their drawing, talking, and building.

Stuart and Anton's Light Trap, Screen 3

Stuart and Anton managed to build a structure that seemed to them to not only trap the light but also keep the light moving. In this case I saw drawing was the leading activity that allowed the boys to more clearly formulate their thinking

and move to new levels of understanding. In this case the two boys worked together to share their existing knowledge and in the process not only extended their individual knowledge but also extended their collective knowledge. Their shared knowledge existed in an interpersonal state through their drawings and they were able to work as co-constructors of new knowledge and understanding. The support each gave the other seemed to be well enough matched to allow transfer of information and concepts. Their task was self-selected and provided the intrinsic motivation that helped them persist in the face of difficulty. Revising their drawings after they had built their structure helped to transform new knowledge from an interpersonal state to a more intrapersonal state as each was able to recall and retell the new knowledge they had acquired.

I was interested to know where Stuart and Anton's notion of light moving came from. I expected they might have heard or seen this concept somewhere outside of school before working on this project. This could be an example of children trying to make connections between their personal knowledge and the systems that exist in the wider cultural community.

Dean's Light Trap

Dean's Light Trap, Screens 1 - 4

Dean had been watching Gordon and Mark as they built their light trap. Mark and Gordon had shared their ideas for trapping light. They reasoned that if they made a completely solid structure then the light would not be able to penetrate it. This meant that the light could never leave the light table and so would be trapped in the table. I suspected that the elaborate nature of the trap,

as well as the large quantity of blocks used, might have impressed Dean because he decided that he wanted to design a solid light trap too.

Dean's first drawing was quite elaborate. He had drawn almost every block, mostly to scale. He had even made some attempt to show the three dimensional nature of the structure. Although his drawing was quite small he assured me that he planned to use the largest blocks and the structure would in fact be quite large. When he counted the blocks he had drawn and looked again at the actual size of the blocks he decided that this plan was not going to work because the end result would be too big for the light table. In this drawing, Dean had used information that he acquired from his peers and was adapting those ideas to fit his own needs. Dean decided to amend his drawing plan when he matched his plan to an evaluation of the blocks that he planned to use. His drawing helped him to revisit and reassess his ideas.

Dean's second drawing looked like a scaled down version of his first drawing. Dean did not seem satisfied with this drawing either and began another just beside it. The scale was larger and the plan different. This third drawing was the beginning of a new idea, however he was again not satisfied with it and began his fourth drawing. He retained the basic symmetrical concept of his previous drawings however this fourth drawing seemed much more elaborate. He drew the blocks he planned to use. Dean seemed to be using his drawings to help him organize his thinking and to develop new plans for building.

Dean seemed comfortable about abandoning a drawing and beginning again. I noticed a developmental progression happening as each drawing was

evaluated and new drawing started. I thought that as Dean was interacting with his drawing he was working through his ideas. His drawing was a way of externalizing his thinking so that he could more easily evaluate it. He was using previous drawings to help guide the future drawings.

Gordon's Light Trap

Gordon's Light Trap, Screen 1

In the first video clip Gordon had finished building his light trap and was revisiting his drawn plan. I had asked him to try to record any changes he made to his plan along with his reason for doing so. I had not watched him build his structure so I had no idea that it was in fact a solid structure. I asked him how his structure trapped the light and he informed me that the structure was so solid no light could get through it. I let him know that I could not tell from his drawing or his structure that it was solid and asked if there was any way he could show me with his drawing that the structure was solid. Gordon sat a while thinking. In the meantime Susan, who had been listening to our conversation, made a suggestion.

Gordon's Light Trap, Screen 2

She suggested that Gordon draw a hole, or gap, in the wall so that you could see inside. This was a technique that she had probably seen used in the many Eyewitness books we have. This series of books often used cutaways to show the insides of things. Susan liked to use this technique herself. However, this suggestion did not seem to appeal to Gordon because he shook his head

and explained that the structure was exactly the same inside so a cutaway would not work.

Gordon's Light Trap, Screen 3

I asked him if it would be easier to draw inside if he were to take it apart slowly, drawing each layer as he dismantled the structure. He seemed to like this idea and quickly got up and started taking the structure apart.

Gordon's Light Trap, Screens 4 and 5

The three drawings (see video clip stills) showed three stages during dismantling. Gordon used his drawings to revisit his experience and to refine and summarize his thinking about what he did. I felt the process of working back from a given point through drawing helped to unpack some of the thinking that was involved in the original construction. As Gordon unpacked his structure he discovered that it was not in fact exactly the same inside. When a dialogue happens between the child and his or her own drawing this could be viewed as an intrapersonal dialogue.

Gordon and Mark's Light Trap

Gordon and Mark's Light Trap, Screen 1

Mark had been experimenting with mirrors and now he seemed intent upon putting a mirror in a light-trap. My expectation was that he was to be working with Gordon. However, Gordon had already drawn out his plan without negotiating with or involving Mark (screen 2). At first Mark seemed willing to use Gordon's plan to build, but as they began to build Mark became unhappy with Gordon's plan and tried to explain why it wouldn't work. Gordon did not look

convinced. Mark persuaded Gordon to sit with him while he drew out his plan. Mark drew as he talked and Gordon watched and listened.

Gordon and Mark's Light Trap, Screen 3

After explaining that the light needed a hollow square structure to travel up, Mark next drew the outside of the structure and shaded it solid. Beside this he drew the inside of the hollow structure. Then using lines to show the light travelling back and forth he tried to help Gordon understand how the mirror at the top was an important feature in order to get the light bouncing back and forth.

As I reviewed the video of the negotiation that took place between Gordon and Mark I noticed the high level of abstraction involved in the drawn plans for the light traps. I was surprised that the children in this class seemed to be able to read and understand each other's plans so easily. I had also noticed that these same children did not have the same kind of fluency or understanding when they wrote out their plans for each other. Not only did they seem to find the writing more onerous but they also seemed to have more difficulty understanding and relating to each other's written descriptions. Perhaps this was because it often took them so long to figure out how to write what they wanted to say that they lost interest both in their own task and in watching another write. In this class, drawing seemed to be immediately accessible, flexible, and engaging. There seemed to be real collaboration and communication of ideas when drawing was the medium for exchanging information and ideas.

The medium of drawing appeared to be operating in much the same way speech did to support interpersonal understanding. There seemed to be a sense

of shared access and dialogue with drawing that is operating in a way similar to a shared oral conversation. Discussion around a drawing provides a social context where knowledge can exist first in a shared or interpersonal state before becoming intrapersonal.

Ryan's Light Trap

Ryan's Light Trap, Screens 1 and 2

Over the course of several days, Ryan had watched his peers drawing plans and making light traps. Although he had not yet built his own trap I observed that he had experienced many different ideas and concepts by watching other children. As he began his own plan for a light trap, I saw him using much of this prior experience and knowledge. It might be said that he was growing into the intellectual life around him. He told me that he wanted his drawing to be a three-dimensional drawing because his light-trap was going to be three-dimensional. He wrote 3d in the top left of his plan. Several other children had mentioned the concept of three dimensions. This class had not received formal instruction from me in the various ways to show three dimensions however this did not seem to have stopped them from trying different representational techniques. This exploration of three dimensions might be viewed as an example of learning leading development, with drawing operating as the mediation tool as well as a leading activity. As Ryan drew, he encountered a graphic problem of how to draw three dimensionally. He talked to me about trying to draw the very long block in a three dimensional manner. He explained that when he held it he could almost see every part of it but that he couldn't draw

it like that. I wondered if he was confusing what he knew and could feel about the block with what he could see. I noticed that in his drawing he had drawn the front face of the block and then drew the two end faces flipped forward so that you could see them. I was not sure that he seemed satisfied that this created enough of a three dimensional effect for the viewer. I tried to reassure him by reminding him that the drawing was to help him build his structure and he only really needed to draw the parts that were going to help him build. I suppose that at that point in time I could have shown him how he might draw something three dimensionally. However, I was more concerned about the end goal of building his structure and felt that a mini lesson about three-dimensional drawing might be more distracting than helpful. Perhaps I missed a good opportunity to work visually at the upper end of Ryan's zone of proximal development. However, I was concerned that any interest in realism might have sent him the message that this was an end goal that I valued and any failure to achieve it might have equally been perceived as a personal failure.

Ryan talked about the darkened space he had drawn and how it was really the inside of his structure with a mirror in there, however he said he couldn't draw anymore (Once you have coloured something with graphite it is very difficult to draw anything else on top of that.). As he explained this to me he suddenly realised that he could have drawn the inside of his structure in another drawing along side the first drawing. As he started to draw the inside of the structure he said, "inside - outside, inside starting right here," as if to reconfirm for himself his solution. He seemed quite pleased with his solution. This incident

reminded me of the importance of discussing drawing with children and how drawing is part of, and works with, other modes of knowing.

Reviewing this video clip, I could see the restructuring of Ryan's thinking. He had tried to represent something using drawing solutions that were already familiar to him. He was using automated and fossilized solutions. However, when reviewing his drawing with me these solutions did not seem quite adequate and he was challenged to consider other ways he might represent inside and outside.

Ryan continued to talk about what he was drawing as he drew. He wanted to show how the light travelled backwards and forwards and decided to put arrows on each end of the light movement line. He referred to them as "arrow keys," a term he probably borrowed from keyboarding or video game playing. On video games the arrow keys might have had a similar directional function. In this case, the process of drawing and finding a new way to represent his ideas seemed to help extend both his drawing repertoire as well as his thinking about symbolic representation.

I considered this drawing event to be a good example of visual thought in action. Ryan was trying to represent an idea he had in his mind. It seemed to me that he visualised his structure three dimensionally and wanted to also represent it three dimensionally. This visual challenge created a tension that moved him to a new way of representing his ideas. Approaching the notion of "inside" and "outside" in a new way extended his representational capabilities. Ryan was able to show a certain degree of mental flexibility as well as a generalized sense of

the concept of "inside and outside" and "back and forth." Drawing was the mediating tool that supported this cognitive growth.

This incident highlighted a problem that I have encountered regularly as a teacher of this age group. Sometimes the children did not have the graphic skills to convey what they meant. The effort involved in working out a solution sometimes created frustration on the part of the child. Sometimes the solutions they used were misleading and created another source of frustration between the child and the viewer. The dilemma I faced, as a teacher who preferences drawing as a meaning-making tool, was how best to balance the child's use of drawing with the skills needed to produce a drawing. I felt it was a delicate balance and any undue weight on the side of performance might be counterproductive. However, exposure to, and experience with, a rich array of graphic influences would extend the possibilities for young children using drawing to make meaning of their world. How one might do this could be the focus of another study.

Rick and Simon's Pinhole Pictures

Rick and Simon's Pinhole Pictures, Screens 1 and 2

As an extension to the concept of light traps, I introduced a few children to pinhole pictures. Pricking a pattern or drawing in black construction paper with a large pin made these pictures. The black paper trapped the light while the pinholes allowed the light to escape and so created a light picture. They often drew their picture on the black paper with white chalk and then took their work down onto the carpet. The chalk lines were used to guide their pin pricks and pushing the pushpins through the paper was much easier on the carpet than

working on a hard desktop. Rick and Simon were the two children who spent the most time and effort doing this activity. They even had series of drawings that told a story. They asked me if they could display their work. I suggested they work together and draw me some plans of how they might do this.

Rick and Simon's Pinhole Picture Show, Screen 3

Rick and Simon sat next to each other and discussed their plans while they each drew their own concept of what the display might look like. These two boys often sat and drew together in their own time. Each child in this class had a drawing journal they drew in most days. They were free to use them as they liked. Rick and Simon spent every free moment working in theirs. They had produced the most elaborate narratives around three well-developed characters. I would classify their journal drawings as spontaneous drawings.

Rick and Simon's Pinhole Picture Show, Screen 4

Rick's first drawing was a plan view for a light picture display. He called this a "birds eye view." This showed a view of the light table from above with the drawings on it. I could even see the pinholes in the pictures. He had drawn the on/off switch and a "birds eye view" of two people looking at the pictures.

Rick's second drawing was a "sideways view," or elevation plan. It showed the light-box sitting on the table, the switch, the pictures, and two people looking at the pictures.

Rick had spent some time working at the light table already so he had a good idea of all its elements. While the light table was visible from where he sat, he drew these pictures with little direct reference to the actual setting. It seemed

to me that he chose the two different perspectives because each held important information that was not possible to show in one drawing.

Analysis of Shadows Section

Our study of light evolved into a study of shadows. As the children had worked with the flashlights, they had noticed not only the different qualities of light created by them but also the different shadows that happened when they pointed the light at objects. There was a little confusion for some children about the differences between shadows and reflections. Two children had noticed that colour was sometimes reflected in a shadow. Another child said that his shadow in a puddle had colour. I looked for opportunities to extend the children's explorations of these areas. Another impromptu discussion about how shadows came to be created involved the whole class. This discussion provided the impetus for a short but intense study of shadows.

Ed's Shadow Theory

Ed was one of the first children to offer his theory about how he thought shadows were formed. His explanation involved the sun, the moon, and their relationship to the earth. He explained his theory to the whole class using three small balls as props to represent the sun, the moon, and the earth. He told us that he had been to the Space Science Centre and they had a model there of how this happens. Several other children had also seen this exhibit and had different understandings of it that they too explained to the class using Ed's props. After their previous work with flashlights most agreed that shadows needed a light source of some kind. They thought the sun was usually this light

source. However, their theories about how the sun created shadows and the nature of shadows was a little less clear. There were several conflicting theories. For example, one child was sure that all shadows were black, while another had seen colours in shadows. One child thought shadows moved and other children thought they did not move. They had many questions: Were all the shadows the same size as the object that created them? Why did their shadows sometimes look very big but sometimes were not there at all? Could one shadow be on top of another and if so what would that look like? Did shadows move? Were shadows black or could they be different colours? These questions came from our discussion and reflected our collective experiences and our understanding about shadows. While different children might have chosen to pursue a particular question they did so with the understanding that they would be sharing their findings and contributing to everyone's understanding and knowledge. I found that allowing children to choose which question most interested them provided the intrinsic motivation that was needed to complete in-depth studies and helped them to take responsibility for their learning.

Outside Shadows

Outside Shadows, Screens 1 and 2

We began our exploration of these questions by going outside around the Campus close to the school. Armed with clipboards and pencils and working in pairs, the class set about recording all the different shadows they could find. They tended to observe and draw small or unusual shadows. The larger shadows of the buildings were mostly ignored. One child suggested that the

building shadow was shade, not shadow. Another child disagreed. It was a shadow but he thought it was too hard to draw something that big.

I took a camera with me and tried to take a picture of the object with its shadow while they drew it. I used these photographs to remind children of the work they had done and to use in displays that told the story of children's learning. As the children drew, I tried to connect with as many children as possible and talked with them about what it was they are drawing and why. I often wrote short notes on their paper as a reminder of the things we had talked about or I helped children label parts of their drawing. Back in the classroom, using these field sketches, we talked about some of the shadows they had found and some of the things they had noticed.

Ed drew the shadow of the bike rack. He said he chose to draw it because the shadow looked so different from the rack and he wondered why that would happen. He noticed that the bike rack did not match its shadow. He thought that shadows were not necessarily replicas of the objects that created them. I noticed in his drawing that he had looped the shadows like a continuous row of 'e's, while his drawing of the rack looked more like a row of 'n's. Referring to both his drawing and the bike rack he was able to point out to me how the hoops of the bike rack had been separate circles that were attached to the bar at the top while the shadows appeared to be a continuous loop. Had Ed not drawn the bike rack I doubt whether he would have observed this detail. When there was so much to see it was often difficult to know what to pay attention to. Choosing to draw something that caught his attention helped to focus that attention. Drawing the

bike rack meant that Ed had to spend time looking more closely at it. In the process of making the drawing he became more aware of what it was that first caught his attention and his drawing provided a means for him to articulate the discovery he made about shadows. Ed's motivation for drawing the bike rack and its shadows was to discover more about the nature of shadows. In this context, drawing was a meaning-making tool. The discussion that occurred around this drawing focused on the meaning that Ed was trying to construct. When I encountered Ed drawing the bike rack our discussion focused upon what he had chosen to draw, why he had chosen to draw it, as well as what he was discovering in the process. Back in the classroom, when sharing his drawing with his peers, he talked about how he had discovered something new about shadows and how this discovery became clear to him while he was drawing. It would have been more difficult for him to share this information with others without his drawing to refer to. Ed's observation, when shared with the class, became part of our collective understanding about shadows. The process of having drawn the shadow as well as the drawing that was shared were instrumental in mediating a new piece of knowledge for Ed and for the other children.

Other children noticed that shadows were not black but rather were darker colours of the surface upon which the shadow was cast. One child noticed that shadows were "darker in the middle." Another child noticed that the shadows of leaves on the trees moved. Each child had a drawing that could be referred to during the discussion. Having the drawings as a common point of reference

helped the children's understanding, focused the children's attention, as well as framing the point made. Sharing the drawings and the information they contained, helped to extend our collective understanding of the nature of shadows. The many different things that the children noticed as well as the different perspectives taken while drawing helped the children see that there were many ways of looking at shadows as well as many ways of recording information obtained from the observation.

Outside Shadows, Screens 3 and 4

Following this activity, I took the children outside on another sunny day to look at their own shadows. They worked with a partner and some chalk to record their shadows on the ground. Two children noticed that there was a difference between shadows while standing and shadows while sitting. They said that a standing figure had more shadow than a sitting figure. Another two children discovered that if they lay down then the shadow almost disappeared.

On another sunny day, I took the children out to revisit the chalk outline drawings. I chose a different time for the visit and asked the children to stand or sit or lie in the same place as they had on the previous visit. They were quite surprised to see that their current shadow did not fit the previous outline. This created a lot of discussion about why this would happen. Some thought it was because the sun was brighter. Some thought it was because the sun was in a different place. Some thought it was because we came out at a different time. This incident provided the provocation for some more explorations.

Outside Shadows, Screens 5, 6, and 7

Ed thought that we would have to come out at the same time to find the shadow in the same place. He had a notion that shadows moved but he was surprised that they moved so much. He thought that coming out one hour later than we did previously should not have made such a difference. Ed wanted to know how fast the shadows moved. After some discussion with Diane (the teaching assistant) he decided to use the three egg timers we had in the classroom to time the shadows' movement (one minute, three minutes, and five minutes). He then selected the shadow of a small tree trunk and placed his clipboard and paper so that the shadow fell on the paper. He drew a line at the edge of the shadow, set his one-minute timer and waited to see what happened. He was quite surprised that he could actually see the edge of the shadow slowly move away from its original position. When the timer ran out, he drew another line to show where the edge of the shadow was then. He continued to do this with each of the egg timers until the shadow had moved all the way across the paper. Recording the edges of the shadow at each time measure he was able to show how far the shadow moved in one, three, and five minutes. With this information, he was able to estimate approximately how far the shadow might have moved in one hour. He measured it out on the grass and could see that it roughly corresponded with the difference between the old body tracings and the new. However, while he was looking at the different body tracings he noticed that they changed shape when they moved. He did not think that his tree shadow had

changed shape. This perceived discrepancy formed the basis of his next question, "What makes the shape change?"

Inside Shadows

Inside Shadows, Screen 1

After sharing our findings from our field-work in our large group meeting there were several children who were very interested in the shape changes of shadows. They wanted to go out again and look at this idea in more depth. However, the weather was not co-operating so we had to devise some indoor experiments. The questions remained general in nature because we had not had enough experience with the phenomenon to raise questions that are more specific. I provided open-ended materials and situations in the hope that this would allow free exploration, some new questions, and discoveries. One group worked with the flashlights that they held in different positions in relation to plasticine models that they made. Another group worked with a lamp that was positioned in one place while movable wooden figures were sat, laid down, and stood at various distances from the lamp. Each context provided different variables for creating shadows.

Ed was so interested in shadows that he worked his way through both sets of materials and settings. He began by making a small plasticine model of a man. Then he placed the flashlight at various positions around his model while he recorded the edges of the shadows in much the same way he had for his tree trunk (see video clip). Ed said that the flashlight represented the sun and that the model represented him outside in the sun. Ed ended up with a great many

different shadow shapes around the plasticine model. He was able to work out that if the flashlight or sun was directly above the model or himself then the shadow would be small and close to the figure. If the flashlight was almost on the table (or the sun low in the sky) then the shadow was very long. When he shared his work with his peers, he was able to point to the shadow outlines and accurately describe where the flashlight would have been. While these recordings perhaps stretch the definition of what constitutes drawing, I included this piece of work because I believe it underpinned some drawing that Ed undertook later. I also wanted to make the point that it was only because I had these drawn records of Ed's ideas, however tentative, minimal, or seemingly unrelated, that I was able to follow the path of his thinking and meaning-making. These drawings, or marks on paper, not only provided a record of his learning for anyone who cared to see, but it also provided me with clues as to what he was thinking about along the way so that I might better provide for his learning and better assist him in the process.

It might seem an overwhelming task to keep all these pieces of paper organized and to review them regularly. However, when the children were a part of the process of evaluating and filing their work in progress it became a very manageable and worthwhile task that was integral to the learning process as well as the sharing of the process. When the children understood that their drawings were also records of their ideas and thinking then they were able to value them for this as well as productively use them to review their own learning paths. They could then share these drawn records of their learning with their families and

visitors to their classroom. When groups of children shared their drawing records with each other they were able to see themselves as part of a larger learning community that extends beyond themselves. They found in others' drawings accessible resources and ideas that they could try on, try out, and extend.

Inside Shadows, Screen 2

Anton, who chose to work next to Ed, also tried a similar experiment with a flashlight. He used a ball of plasticine with some sticks stuck in it for his model. He said it looked like a tree or a bush. He had watched Ed's experiment outside with the tree trunk shadow and had heard that Ed did not think that his tree shadows had changed shape. He stated that he thought tree shadows did change shape and he wanted to show Ed how. Anton also recorded the outlines of the shadows as a flashlight was held in different positions around his model. As Diane worked with him (see video clip) he discovered that he could also represent night by switching the flashlight off and that then there were no shadows.

Inside Shadows, Screen 3

Dean, who also worked beside them, was concerned about the quality of shadows. Outside, during our fieldwork, he had noticed that shadows were darker in the middle. He noticed how Ed and Anton had drawn their shadows as outlines and he was concerned that this did not adequately represent shadows. He made two plasticine models, one of a dog and one of a man. His rationale was that one was small and closer to the ground and the other tall and they might have different shadow qualities. He then set a flashlight on one side of them to

cast the shadow and tried to record the quality of the shadows using charcoal. He said he chose charcoal because he knew it had a good range of shades of grey. Drawing the shadows was a challenging task because it was difficult to see what he was doing as he worked. He had to keep switching the flashlight off to see what his drawn shadow looked like without the actual shadow cast on top of his drawing. Of course as soon as he switched the light on again his drawing sat under the shadow cast and it altered the tonal range of the shadow. However, he was able to see and record to his satisfaction that the shadows of both models were in fact darker, or more dense towards the middle of the shadow and that the edges of the shadow were actually quite fuzzy and could not be described in a single sharp line. He seemed quite taken with this piece of information. Many of his subsequent drawings and paintings included shadows. He said it helped make things look more real and three-dimensional. I remembered that Dean had been one of the few children who had attempted to render his plan for his light trap in a three dimensional way. I found it interesting that these two boys had taken a question and explored very different aspects of it. As I tried to trace back to what might had motivated their particular explorations I could see the influences of those around them on their thinking. It was difficult to untangle where each idea originated and who exactly was involved. Many of the original ideas had existed first in the shared space of the class during discussions. It seemed as if they sifted through common information for ideas that resonated. Often I found that they had also either watched one of their peers do something or had been part of smaller discussions around different but related ideas. The

social context within which learning had taken place and the emphasis on sharing ideas created the opportunities for new knowledge to exist amongst children. The drawings the children made in these contexts greatly facilitated the sharing by making ideas more visible to a wider audience. There seemed to be something about the concrete nature of a drawing that gave the idea more weight than just discussion alone might give. The simultaneity of the presentation of information in a drawing seemed to facilitate access to the information. I noticed this when I shared a book with children. The picture on the front cover always elicited more discussion than the title or description on the sleeve. When children were drawing, and I moved amongst them as they worked, I was more quickly able to take in the gist of what they were working on than when I had to stop and read their text. My experience has also been that young children notice many more details in visual images than I do or some other adults do. They seem to be fascinated by details and will willingly spend hours looking at the dense visual information in the "Eye Witness" and "Where's Waldo" type of books.

Inside Shadows (Wooden Figures), Screen 1

The next activity Ed undertook was to work with the wooden manikins and the lamp. I had placed the manikins on a white cloth so that their shadows might show up more clearly. I also provided different level surfaces on which the manikins could be placed. The children had quite a lot of fun setting them up and deciding how they should be placed. Many of their decisions seemed to be based on the experiences they had had outside when they chalked around their own shadows. The manikins were sat and laid down as well as stood. At a certain

point in time, everyone agreed on an arrangement and then did not move the figures again for a few days. At this activity, I had provided the children with some boxes of conte crayons. These crayons come in a range of tones of grey with black and white at the extremes. I also provided erasers and drawing pencils in a hardness range from B to 6B. I showed the whole class how to use and care for these materials and I pointed out the tonal features that might help them better describe their shadows. I suggested that they first experiment with them on the scraps of paper that I provided.

Inside Shadows (Wooden Figures), Screens 2 and 3

Ed began by spending some time experimenting with the materials and then chose to use a combination of conte and graphite. He then launched into an ambitious drawing of the whole setting. He included the cloth, the lamp, all the figures, and the different levels. No other child tried to do this. He carefully drew all the wooden figures, paying particular attention to how they were positioned. Then he singled out one to pay particular attention to and began to draw its' shadow. He told me he had noticed that there was a difference between the size of the figure's head and the size of the shadow that the head cast. The shadow was much bigger than the head. He spent a great deal of time and care trying to ensure that his rendering of the head and its shadow was somewhat proportionally congruent with what he saw. I began to see some relationships between Ed's drawing of the bike rack and its shadow and his plasticine model. Ed seemed interested in the size and shape of the shadows in relation to the objects that cast them. It seemed to intrigue him that there should be a difference

in size and shape between the two. This latest drawing looked at the same idea in a different context. When I grouped the three drawings Ed made together, I could see the connections between his ideas. Without these drawings, I doubt if these connections would have been as accessible to me.

Ed next focused his attention on the different tonal range that he observed within the shadow of the head. Reviewing the video data I noticed that he was working next to Connie who was experimenting with the tonal range she could achieve in relation to what she saw. I could see Ed copying many of her actions. There were also several other children drawing off camera and they were all involved in similar experiments. There was much sharing of ideas and findings during this process. This was an interesting scenario where all are novices in the art of creating tonal ranges in shadows. I noticed the children were talking aloud about what they were doing. They also looked frequently at each other's drawings while they worked. This seems consistent with Vygotsky's notion that new knowledge exists first in a shared or interpersonal state before the child gains enough understanding for the knowledge to exist in an intrapersonal or independent state. Yet, intrapersonal knowledge is brought to the interpersonal exchange as well. This is an example of the dialogic nature of learning. I also noticed that Ed had moved from describing the shadow with a line to using a tonal approach. As he did this, I saw evidence in his actions of performance coming before competence. As he explored the possibilities of the materials in relation to the effect he had in mind, there was much trial and error happening. This was the same for all the children in this group and it was the nature and

outcomes of these trial and error activities that they shared with each other. For example, Connie told the others that she could put white on top of black and make the shadow lighter at the edges. I saw evidence of co-construction of knowledge in these exchanges of information and the adoption of strategies suggested by others. As I watched and listened to the children's exchanges I was also aware that the differential between the novices and the experts was so minimal and varied that each seemed to operate in both modalities at different times. This well-matched range of novice to expert understanding provided for a very rich exchange and a rapid accumulation of knowledge and skills. Had I been free to work along side them at that time I wondered if my expertise might in fact have hindered their progress? While Vygotsky did write about the individual in relation to the ZPD, he did not write much about the optimum range of difference between novice and expert.

The experimentation with the drawing materials in this context had many of the characteristics of play. It acted as a generative activity that extended the possibilities for representation. The outcomes of the children's experiments led to new growth and development in relation to their understanding of the nature of shadows and their representation. In this case, I would say that the drawing activity was a leading activity. While the drawings were being done individually, the effort was a collective one that built upon itself and initiated new actions and ideas.

Inside Shadows (Wooden Figures), Screen 4

Ed allowed me to share his discovery about shadows with the whole class (see video clip). When I was talking about children's drawings with the class I was aware that I was providing a model not just of the language I use to describe what I see but also what it is that is of interest to me in the drawing. When my comments focused on the meaning the child was working with it gave me a framework within which to work that promoted the child's efforts and highlighted his or her thoughtfulness. I hoped this focus helped children to value their drawing efforts as a tool for meaning making.

Inside Shadows (Wooden Figures), Screens 7, 8, 9, 10, and 11

Many children decided to arrange and draw the wooden models and their shadows. I was particularly interested in one child's persistence. Rick returned repeatedly to draw different figures in different ways. He seemed to derive a great deal of pleasure from his efforts. Other children seemed to like to work next to him and would often watch what he was doing and try to copy him. The video camera caught a particularly representative scene of the kind of unobtrusive support Rick was able to lend to his peers in the context of drawing (see video clip). This was a good example of scaffolding. It seemed to me that Rick understood the nature of support needed to move his peer closer to his goal of describing the shadows. By completing the figure for him, his peer was then free to concentrate on describing the shadows he was interested in observing.

Like the other children in the class, Rick kept his drawings and the work he was doing about shadows in a hanging file folder. The children had been

taught to name and date all of their work. On several occasions Rick took his drawings of the wooden figures out of the folder and arranged them on a table. He arranged them both chronologically as well as according to criteria he developed for himself. The criteria he shared with me were concerned with things like the one that had the best shadows and the one that most looked like the figures. He liked each drawing for different reasons. For example, he liked the figure lying down that is drawn with conte crayon because it was the only one he did that shows the shadows on the figure as well as around the figure. His favourite was the standing figure because it was the most difficult to draw and because it showed how the shadow took on a similar but exaggerated shape as the wooden figure. He also said he thought that his drawings got better over time and that it got easier to draw the figures. He seemed to get some satisfaction from reviewing his work and seeing his own progress.

Inside Shadows (Wooden Figures), Screens 5 and 6

Amy also spent quite some time drawing the wooden figures and had some interesting observations to share with the class (see video clip). She had noticed that there was a difference between the shadows of a person who was sitting up and a person who was lying down. It seemed to me that the process of drawing the different shadows had rendered this previously unnoticed phenomenon visible. Many children were surprised and excited about their findings when engaged with drawing. These unexpected discoveries as well the encouragement to use drawing throughout this study stimulated the children to initiate drawing more frequently.

Analysis of the Cameras Section

The topic of cameras was introduced to the children in several ways. First, we had a large group discussion about our various experiences with cameras and photographers. I asked the children to draw and write about some of these experiences. I also placed three or four different old cameras in the middle of a large table for the children to pick up and examine. Beside these cameras, I put a few children's reference books about cameras and photography, some pencils, and paper. I invited the children to have a good look at the cameras, to draw them, and to try to figure out how they worked.

Introduction to Cameras, Screen 1

During our initial discussions, Gordon shared a story of his experience of having his photograph taken with his younger brother by a professional photographer. He was very impressed by the lights and expanded upon this for the class by drawing diagrams on the white board to help him explain the intricacies of the lighting. He thought that the protrusion on the top of the lamp was a heat detector. It seemed that the reason there was a heat detector was that the photographer could not see the people he was photographing with a hood over his head and therefore needed the heat detector to "see" the subjects. Gordon said he did not really know why the photographer had a hood over his head. One of his peers offered the suggestion that it had to be dark for the camera and that the photographer could not see through the viewfinder if the hood was only over the camera. These spontaneous concepts formed the basis for developing scientific concepts that became abstract through drawing,

discussion, and sharing ideas both within the class and at home. Gordon was bringing his prior knowledge of photography studios to the discussion of photographers through his drawing on the white board. This discussion, assisted by the drawing, challenged some children's assumptions and helped Gordon formulate the beginning of an idea as well as prompting several related questions. In this event new knowledge existed in an interpersonal state that was facilitated by the drawing. The dialogue that occurred during the drawing focused on clarification for meaning or better understanding of the ideas. In this case, the drawing revealed some of the spatial and operational clues necessary for understanding Gordon's explanation. Without the drawing, Gordon was struggling to make himself understood.

Introduction to Cameras, Screen 2

After this meeting, Gordon drew a detailed picture (See Gordon's drawing) of his visit to the photography studio. However, in this drawing he drew the photographer without the hood. He told me that he wanted to show how he had to sit for his photograph and how the area where he sat was brightly lit while the rest of the studio was in darkness. He also wanted to show the buttons on the camera and the connection between the camera and the light because he thought it was the camera that made the light work. I noticed that the light was flashing although neither the photographer nor the camera was under the hood. Gordon told me that he wanted to show the buttons of the camera and that if the hood were covering it then the buttons would not be visible.

In this drawing, I saw evidence of Gordon thinking through the operation of the studio flashlight. He was bringing the information generated during the large group discussion, as well as his prior knowledge, to the task. His focus in this drawing was on the buttons to press in order for the light to work as well as the question of which areas of the room were dark and which were light. It seemed to me that this drawing had facilitated some intrapersonal dialogue between Gordon and the various theories he was considering. As Gordon drew his ideas he was able to cross process and transfer ideas from one context to another. Making his thinking visible to me, as his teacher, greatly assisted me to plan and program for his growth and development. When I could see what Gordon was thinking about I could dialogue with him. I was able to create a continuous spiral of inter and intrapersonal processing that helped Gordon function at a higher level of thinking. In this context, I saw drawing functioning as a leading activity because it was helping Gordon build a clearer understanding of the relationship between the camera and the light. The difference between the two drawings, the one on the white board and the one done at his table, also reminded me that it could take several drawings to process an idea.

Introduction to Cameras, Screen 5

Amy seemed intrigued by Gordon's drawing on the white board. She told me that she had seen the same lights when she was getting her picture taken. She also featured the cable from the camera to the lights (see drawing and writing). I notice she has something that looks like a "heat detector" on one of her lights and wonder whether Gordon's drawing influenced her. I also wonder if she

has imagined the many different coloured lights because she wanted to make a feature of them or if they actually were there. My conversation with Amy was cut short so I did not get a chance to ask her about my speculations. Not being able to discuss Amy's drawing with her once again helped me realize how important it was to take the time to talk with children about their drawing. It is interesting here to contrast the information displayed in her drawing and the information contained in her writing. Amy has managed to put information in her writing that complements her drawing. As she said, "I have to tell you what you can't see."

Introduction to Cameras, Screens 3 and 4

Ed decided to draw an event that described the taking of a class photograph the previous year. He placed the viewer in a similar position to the person taking the photograph. The photographer was oriented away from the viewer and placed between the viewer and the children. The children and teachers were drawn smaller than the photographer to indicate the distance between them. As Ed explained in his writing, he had made very deliberate graphic decisions in relation to space and size. The photographer had taken a considerable time to place the children and the teachers according to size. I expect this might have had some impact on Ed's memory of the event. In this drawing, I could see that Ed had used some spatial graphic conventions that he had assimilated from his viewing of other images in the culture in which he lives.

My hope was that by asking the children to draw some of the things they had experienced in relation to cameras and photography they would more easily be able to recognize what it was they already knew. In turn, they would then be

able to identify what they would like to know more about. Sharing these drawings would allow everyone in the class to also see what other children knew about cameras and photography as well as open the conversation around this topic.

Drawing and Experimenting with Cameras

Drawing and Experimenting with Cameras, Screen 1

Ed and some of his peers were keen to examine the cameras I had put on the table. They spent a whole session just looking at the cameras, pressing all the buttons, opening any part that would open and pretending to take each other's photographs. They also browsed through some of the books that I had provided. The next day they each chose a camera to draw and settled down to make a detailed observational drawing of it. As they drew, I encouraged them to also check the reference books and see if they could find labels for the different parts of the camera as well as any information about the function of these parts. During this process of discussing, drawing, researching, and labelling each child had the opportunity to develop theories about how cameras worked.

Observing the children handling the cameras before making drawings of them reminded me of the importance of touch for young children in relation to drawing. In my Masters study, I found that when children had a chance to touch and manipulate the things they planned to draw, they were better able to represent the features that were important to them.

Drawing and Experimenting with Cameras, Screens 3, 4, 5, and 6

Ed and Joe worked together, each with their own camera, to try to figure out the purpose for all the different parts of the camera. As they did this they

were able to exchange ideas as well as compare and contrast the similarities and differences between the two cameras. Both children drew their camera from the front, back, top, and bottom. Ed had organized his four drawings in a sequence down the page while Joe had divided his page into four quadrants, one for each view. Ed chose to draw the outside front of the camera first followed by the inside of the camera and then the top and the bottom. Joe drew the front, back, top, and bottom but did not drawn the inside. Ed spent considerable time drawing the inside of the camera. He would often bring the open camera to me to discuss how he thought the film would fit and how he thought the picture went through the lens to the film. He was quite puzzled that the viewfinder and lens were located in different places on the camera and seemed independent from each other. Ed spent quite some time looking through the reference books for information about how the camera worked. Ed's focus on the mechanics of the camera seemed congruent with the focus he had when examining flashlights. In contrast, Joe seemed more interested in finding many labels for the different parts of the camera. He spent a lot of time matching the labels he saw in the reference book with the corresponding parts on his camera and recording this information. I noticed that there were many more labels on Joe's drawing than on Ed's drawing. When I compared the two drawings, I could see evidence of two very different ways of working as well a difference in focus. Both Ed and Joe had cameras identical to the ones they found in the reference book. While the book used photographic images rather than drawings to illustrate how cameras work both Joe and Ed copied many of the presentation strategies the book uses. For

example, different points of view, arrows, headings, and complementary text. I could also see evidence of the two boys copying each other's strategies. I considered copying from peers as well as from other forms of representation to be good ways of extending children's drawing vocabularies. This drawing event is a good example of the social and cultural influences at work on the drawing process.

Drawing and Experimenting with Cameras, Screens 8 and 9

Ed continued his examination of cameras with a series of drawings of a different camera. He laid out this drawing in a step by step, instructional format. In these drawings, he had only drawn the components that the operator of the camera would use while taking a picture. He only labelled the functional components that needed identification or instructions in order to operate the camera. He complimented this drawing with a written text that explained how to take a picture. Ed seemed to understand the features of his drawing that were salient and knew how to compliment them with text. Perhaps knowing that he would have to share this drawing with his peers helped him understand the perspective of his audience. This drawing not only helped Ed make sense of the way a camera works but it also helped others make sense of how to operate a camera. The two drawings that Ed had done provided me with examples of two different uses of drawing as well as two different presentations. Ed's presentation formats helped me identify the ideas Ed was working with.

Drawing and Experimenting with Cameras, Screen 10

The video clip of Ed explaining how a camera works was taken just after he had finished his second drawing and reflects the comprehensiveness of the understanding that was mediated through and by the drawings. As Ed points out, it was a long story.

Other Examples of Children Drawing Cameras

I included this selection of drawings to give the viewer some idea of the similarities and differences between the drawings of cameras. I have not done an analysis, but invite an examination of them.

Taking Photographs

Taking Photographs, Screen 1

Ed's reward for his patience and research into how cameras work was that he was now able to take a picture with the classroom camera. This coincided with a visit to the classroom by a professional photographer. To everyone's great delight, the photographer brought a set of lights. He also brought several other pieces of equipment and some different cameras.

The photographer talked to the children about the training he had to become a photographer. He explained how there were different kinds of photographers and what his specialty was. He also gave demonstrations about how the cameras and lights worked. By now, the children had many questions for the photographer. Gordon was able to clarify the reasons for putting a black hood over one's head and camera as well as get an explanation about the mechanics of the lights. Amy was able to confirm just how many lights were used at one time

and why. The photographer shared many useful tips regarding composition and lighting and allowed the children to see some of the differences composition and lighting made through the viewfinders of his cameras. At this point Ed remembered how squashed together everyone had been in his class picture and linked this memory with the restricted views he found when looking through the viewfinders. Now he understood why the photographer wanted them to stand so close together. Without having done drawings of cameras and photography before this visit they would not have been able to have had such a productive exchange.

Taking Photographs, Screen 2

When the photographer had finished his presentation, the children selected various pieces of equipment or other relevant information to record on their clipboards. This information was used to help them with further studies of cameras and photographers. Ed chose to draw the light. The class discussions about lights prompted Ed to pursue his own understanding through his drawing.

Inviting a photographer in to talk about his work, recording what he said as well as drawing his equipment exposed the children to supraempirical systems around the topic of cameras. The children were able to develop more elaborate concepts of "camera" and "photographer." Drawing this photographer's equipment and comparing these drawings with the earlier drawings of the cameras in their classroom was instrumental in the process by which children grew into the intellectual life of those around them and broadened their definition of camera and photographer.

The day after the photographer's visit, Ed came to school with a biography of a well known photographer. This children's book showed some of the photographs that the photographer had taken when he was a child the same age as Ed. It also gave a lot of information about some experiments with point of view. For example, the child in the book had taken a picture of his toy truck by placing both the truck and the camera on the floor thus giving the illusion that the photographer was standing beside a full-sized truck. We read this book to the class and it greatly influenced some of the photographs the children took.

Taking Photographs, Screens 3, 4, and 5

Ed carefully planned the photograph he would take in the classroom. He wanted to take a photograph of something that was "very important." He chose the white board that we used to organize our activities for the afternoon. He wanted to take a photograph of it as he usually viewed it, sitting on the floor with his peers in front of it during the large group-planning meeting. He also made a drawing of how he wanted to frame the white board. The process of making a drawing included framing decisions that were similar to the ones he would use in photography. Drawing also helped Ed construct a better understanding of the relationship between what one sees in the viewfinder and what is reproduced on film. Previously Ed had wondered about the difference between the viewfinder and the lens. Ed discovered that he had to turn the camera on end in order to fill the frame and see an image like his drawing. He had also tried to make a connection between the composition of the class photograph and size of the image. Framing his drawing, as well as selecting a specific point of view, helped

Ed restructure his understanding to accommodate this new knowledge. Drawing in this context was working at an intrapersonal level to mediate between old and new knowledge.

Making Moving Pictures

Several children were interested in moving pictures and movie cameras. Amy's father was a cameraman for a local film production company and her uncle worked for Pixar making animated movies. Amy's uncle often sent her letters in the form of cartoons, and she shared some of these with the class. She had visited her uncle's work place and had been shown some of his work.

Making Moving Pictures, Screens 1, 2, and 3

My teaching assistant worked with a small group of children to design a moving picture story. It consisted of a long strip of paper and an acetate strip that slid along over the top of the paper. The long paper strip had background drawings on it while the acetate strip usually had the character that was moving across the background. The children first made a plan by sketching out their ideas and writing the first draft of the script. (You can see what this looked like and hear Amy's story in the three video clips.)

The graduate assistant interviewed Amy about her story strip. She asked Amy what changes she made when she transferred her drawn plans to the finished product. At first, Amy talked about the more representational similarities and differences between the two drawings. These consisted mainly of minor refinements and the inclusion of more details. Amy said she liked many details. Given more time, Amy began to talk about some of the more subtle elements of

her drawing. She had chosen the colours carefully because she was aware that they added "attitude" (her word) to the drawing. She talked about using green and drawing trees although she acknowledged that we are not sure what it really looked like in prehistoric times. She said she took her information from the museum where they had displays of dinosaur habitats. Perhaps more important to her were the few spots she had put on the Tyrannosaurus Rex. I sensed that she was keen for the graduate assistant to notice them. She said that Tyrannosaurus Rex was mad because he still had spots. The graduate assistant knew that many children in the class had been absent with chickenpox and discovered that Amy had been one of them.

There were a great many things happening with drawing in the context of making their strip stories. The group who chose to participate in this work shared many ideas, techniques, and solutions to problems while developing their moving pictures and stories. While each of their stories was personal and different, they copied many strategies from one another. Amy did not make too many changes to her final drawing, however many children did. Having to do a first draft was an important step in the process. Rather than putting all the information in one page frame, the strip tended to dictate that there be a sequence of images that followed each other logically as well as connect visually. The size and the placement of the overlaid figure was something many children struggled with in their first draft. However, having the draft to play with allowed the children freedom to generate ideas and solutions. The two levels of drawing, the draft and then the good copy, allowed meaning to exist first at a referential level and as an

abstraction of ideas. The drawing then evolved, taking on a more contextualized and personal meaning. The details that Amy added also added very personal meaning to her story.

Ed also made a story strip. However, he seemed to think that this was a poor relation to how a moving picture really worked. He took a large sheet of paper to a quiet spot in the room and very carefully, over a period of two days, drew out plans to show me a better idea. When he finished, he used his drawing to explain his idea to me. He told me that he remembered seeing somewhere that in order to make a moving picture you had to have lots of very small pictures on a strip of acetate. This strip had to move very quickly over a light source that then projected the images onto a screen. He reasoned that the picture had to move in order to show movement. He told me that the cameras in our classroom could only take one picture at a time. However, he knew there were other cameras that took many pictures one after another that come out on one very long continuous strip. Ed persuaded me that if I could give him a very long strip of acetate then he could make a moving picture for me.

In this scenario with Ed, I saw Ed in the context of and in relation to what has preceded this activity. In this latest work with moving pictures, Ed had taken ownership for his shared understanding and experiences and had extended his thinking in new and personally meaningful ways. Ed's growth and development was a process that had extended over a considerable period of time, and would be likely to continue to expand as he encountered new ideas. The drawings Ed

had done along the way were instrumental in facilitating and mediating this growth and development.

All members of the class had engaged in similar processes of "negotiated production through activity with an implicated future and an intertextual[29] past" (Wink & Putney, 2002). Together these drawings and discussions provided an example of the collective history and mutual meanings shared by this class, or intersubjectivity (Wink & Putney, 2002). This discursive system of enquiry that had been led by drawing had become an integral part of the children's ongoing learning.

Building Their Own Photography Studio

We took the whole class on a field visit to a photography studio. The children studied the process of getting a photograph taken from beginning to end. We started with the reception area and the receptionist who makes the appointments and keeps records and details of each session. We then toured the waiting area, the prop room, the studios, the dark room, the preparation room, and the framing area.

The photography studios interested the children the most, especially as they were able to see several people come to get their photograph taken (Graduation pictures). The children each had a clipboard with several sheets of paper so they could make many drawings and take notes about what they saw.

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[29] Intertextual is that place of learning that makes connections between something we have read or talked about previously and something we are reading or talking about now. In this context, I would like to include drawing as a text.

Back in the classroom we shared and reviewed the information we had gathered in our drawings and notes.

One group of three children was very keen to recreate a photography studio in the classroom using the hollow blocks and the unit blocks. I was aware that even although these three children had experienced the same studio on their field visit they might still have very different ideas about how they could build a photography studio. I asked them each to draw a plan before they started to build. At this age one of the challenges children face during collaborative block play is to come to a common understanding and agreement about what they will build, where, and who will do the building. They also often find role assignment and turn taking difficult. If each of their ideas were made explicit through a drawing, then we would have a vehicle where we might more easily reach a common understanding. Using their drawings as a reference point, we would be able to make decisions about what to build and where, as well as negotiating a consensus about the roles each would play.

Building Their Own Photography Studio, Screens 1-11

The series of video clips shows a little of how this process unfolded. The first and second clip show how one child was keen to begin building without looking at the others' drawings and ideas first. They show the nature of verbal support I gave the children in order to effectively use the drawings they did. You can hear one of the children paraphrase my words. In the process of negotiating where the seat for the client might be placed in relation to the camera, much important information was recalled by the children. One child remembered that

when he took a picture of someone who was too close to the camera then the picture was "all foggy" (his words). Using their drawings as mediating tools they negotiated a suitable distance between the seat and the camera as well as how high the camera should be. One child drew a person in relation to the camera to show the structure in proportional relation to a child. In the third video, it becomes clear that there was a significant difference between two children's understanding of the scale of the project. One child assumed they were going to use only the unit blocks while another child assumed they were going to use the larger hollow blocks. Sharing their drawings clarified this point while also helping to resolve it. Anton re-evaluated his drawing and labelled it with the words "holo bloock." Across this conversation, you can hear Anton talk about why it was important to have the seat at the right height. He remembers the information shared by the photographer about framing the image. From this video clip I could see how each child had many ideas. However not all ideas were easily heard or recognised. Drawing helped to make ideas visible.

When the photography studio was built and roles assigned, the children began the process of taking photographs and processing them. One child sat on the client's seat while the other looked through the "camera lens" and drew the person seated. The drawings were simple line drawings that were then taken to the processing plant. In order to represent what happened when a photograph was processed the children in the processing plant shaded the line drawings different shades of grey (see final clip). The finished product was then "sold" to the client.

Using drawings as a mediating tool within the social context of block play proved to be successful in this event. Drawing helped to mediate between thought and action. The children did not all begin building in the random and impulsive manner that often leads to disagreement and the play sequence breaking down. Drawing helped the children clarify their thinking and share it with others. Drawing helped the children remember particulars from their field visit. Drawing helped the children come to a common understanding about how the play event would be constructed and what their various roles might be. As they discussed their drawings they could easily see that there were different understandings that needed to be clarified before they started building. While I seemed to be doing a lot of coaching in this particular event it was not something I had to continue for long. This group of children also used their drawings to assist other children to become meaningful participants in their play event. They showed their drawings to Susan and she was quickly able to see that they did not yet have a developing studio. She was able to negotiate her entry into their play by producing a drawing of a processing department and explanation of her idea and the role she would play. Using drawing as an entry device to a play event alleviated the typical rejection that comes with the more ambiguous question, "Can I play?".

Careful and detailed analysis of the data has revealed multiple complex uses of drawing for the children in this study. In the following chapter I will highlight the conclusions and make recommendations.

Chapter Five

Conclusions and Recommendations

Throughout my analysis I was encouraged by the many ways that drawing was able to support children's learning. The children in this study embraced drawing as a meaning-making tool and used it productively and thoughtfully. It was tempting to include observations about drawing, teaching, and learning that might help to address issues outside of the narrow framework I had set myself. However, I have restricted my concluding discussion to the Vygotskian framework I laid out in Chapter Three. I will discuss the research questions in this order:

1. What does a Vygotskian, social constructionist perspective of drawing reveal?
2. What is the relationship between thought and drawing?
3. Can drawing be an activity that leads development?
4. How can drawing function as a tool for learning?

This chapter concludes this study by pulling together important elements from the analytical framework provided by these four questions. Recommendations are made throughout.

1. What Does a Vygotskian, Social Constructionist Perspective of Drawing Reveal?

Vygotsky viewed learning and development as dialectical in nature. He saw learning and development working together as a dynamic process in a socio/cultural/historical context that operated on three levels. The first level is the

immediate interactive level, the second is the structural level, and the third is the more general cultural or social level (Vygotsky, 1978). While I have separated these levels for the purpose of discussion in order to refer more easily to specific details they function as levels closely interwoven within the whole context.

Video data were particularly helpful when examining the contexts of the study because in a video clip I was able to see many of the fine nuances and interactions replayed in all their complexity. In this study, I am interested in what children bring to the task, their interactions with their environment and how they work to solve the problems or questions they encounter. My focus was not on the performance level the children achieved but rather on the methods or the process by which performance was achieved.

Immediate Interactive Level

At the immediate interactive and dialogical level, I have demonstrated in my analysis that drawing serves a useful function in supporting learning in the social context of the classroom. The drawing and learning dialogues operate on two levels. First, there is the interpersonal level where new mental processes first exist in shared contexts before they are internalized. Then, the intrapersonal level where new knowledge is internalized and the dialogue continues at a metacognitive level. Vygotsky recognised the school as an important site for promoting the shift from personal experiences and interpersonal dialogues to more complex supraempirical systems and metacognitive thinking. When children are exposed to other ideas through their interactions with others in their community they are able to grow into the intellectual life of those around them.

While it is important to recognise these two levels as distinct, it is also important to remember that they work together in a continuous dialogic spiral.

Interpersonal Level

When I placed several old cameras on the table for the children to examine, I was setting a social context for the examination of the cameras that would ensure opportunities for interpersonal exchanges and the creation of new knowledge. Interpersonal dialogues often began with exploratory behaviour that was accompanied by verbal dialogues that shared observations and prior experiences amongst small groups of children. Physical handling of, and experimentation with, objects seems to be an essential precursor to any in-depth investigation or abstraction. Examples of this can be seen in the handling of the flashlights and the cameras before these were drawn. During the phase of interpersonal sharing of knowledge, children build an understanding of an object that does not solely depend on sight. The physical handling of objects brings a spatial awareness as well as a textural awareness. This physical knowledge seems to be an important factor in children's later ability to represent objects. Ed's ability to represent the flashlight from a different perspective than the one in which he saw it was contingent upon the physical explorations he had made before drawing.

At an interpersonal level, one of the functions of drawing is to provide a referent to the object, drawing the experienced object into the symbolic realm. Examples of this can be seen in Ed's initial drawings of his flashlight. While he was drawing his flashlight, he was also talking with his peers about the flashlight.

He was looking at other drawings children had done of the flashlight as well as receiving responses from his peers about his drawing. The drawings provided a common point of reference that was shared amongst the children. Another example at an interpersonal level can be seen in the video clip of Gordon drawing on the white board. As he drew the large lights of the photography studio, others were able to see what he was talking about and enter a dialogue with him. We were able to see the new knowledge that was being presented. This knowledge existed at an interpersonal level. His drawing was the mediator for an interpersonal dialogic exchange, the foci of which were emergent ideas and theories about the functioning of the light. These ideas contained much physical and spatial information that may well have been lost in a verbal exchange or would have put too much demand the child. The nature and content of the exchange between the teacher and the child in relation to the drawing and the ideas was a good example of the kind of support that is needed in an interpersonal dialogue that includes drawing. It is an exchange that aims to understand what the child is trying to show in his or her drawing and what the emerging ideas might be.

The video clip where Gordon and Mark are discussing the building of a light trap is another good example of drawing mediating at an interpersonal level. The drawing acted as a direct referent to the light-trap that was under negotiation. In this instance, the drawing allowed Mark to show Gordon what he meant. As they discussed their building plans and ideas, the drawing(s) acted as a common point of reference. It allowed for new knowledge from each child to

exist in a shared state before being assimilated into new perspectives on how the building might be built. In this context the drawing was not only acting as a mediator between new and existing ideas, it was also acting as a social mediator that facilitated a common understanding and an agreement on how to work together.

The interpersonal level could be viewed as the foundation from which the intrapersonal level grows. I would suggest that it is important to pay close attention to the kinds of activities, opportunities, and discussions that accompany the interpersonal level. It is at this time that children's ideas, questions, and misconceptions are most visible. This study suggests that drawing can help children make their ideas visible. When drawing is one of the modes of exchange these drawings can be preserved as a record of children's current thinking that can be reviewed and revisited by both teacher and child, but they can also serve as a vehicle of exchange within the wider learning community.

Intrapersonal Level

Intrapersonal dialogues are necessarily harder to see and provide examples of, as we cannot see what is happening inside another person's head. However, this study has some interesting examples of children's metacognitive thinking becoming visible through the transformations represented in and through their drawings. For example, when Ed made his first drawing of the red flashlight he had been concerned with the concept of "on/off." However, when he was challenged by his peers that his switch did not adequately describe the three levels of "on," he used his drawing and his intrapersonal dialogue with his

drawing to develop a representation that more clearly described the three different levels of "on." When Ed made these additions to his drawing, he already had a good foundation in his original drawing from which to work. No doubt, his evaluation of the information missing from his original drawing helped to move him to a more complex level of representation as well as an elaboration of his thinking about the three levels of switch. This expanded and elaborated drawing is representative of an intrapersonal dialogue made visible to us through a drawing. However, it was also the challenge to his representation that provided the stimulus for Ed to move to this higher level of thinking and elaboration. The challenge was not for Ed to produce a more realistic drawing but rather to more clearly represent the ideas he was working with. A social constructionist perspective of reality would contend that reality is a construction that is influenced by social, cultural, and historical factors. "The nature of human visual perception is not one of recording the objective reality that exists independently of observation but rather of actively constructing an image of the world that is only partly based on retinal stimulation" (Ruby, 2000). The eye as it is attached to the brain only registers part of the data. The brain forms rapid hypotheses that complement the retinal image and constructs an interpretation of what is seen. The children in this study seemed to respond to and benefit from the discussions and critiques that focused on the message or idea that the representation had the potential to convey. It is a discussion that focuses on the construction of the representation rather than on a verisimilitude to some unattainable reality. On the

basis of my observations I would recommend discussions and critiques that focus on such key ideas.

In a similar way, when Gordon drew his second drawing of the lights in the studio he was building on his experiences of his first drawing. He was also cognisant of all the comments and information he had received from his peers and the teacher in the large group meeting. His second drawing was an extension and elaboration of his first drawing on the white board. The discussion and thoughts generated from his first drawing caused him to revisit his ideas. Through the process of redrawing, his thinking about the function of the lights in the studio changed. Drawing at an intrapersonal level helped Gordon integrate his new knowledge with his previous experiences and ideas. In his second drawing, we can see evidence of both his previous and his new thinking. The drawing reveals a transformation of thinking that is indicative of an intrapersonal dialogue or internal revisualization. I found this drawing remarkable in its complexity. It contained a quantity and quality of information and ideas that I would suggest would be difficult to convey or access in a written text. One of the great strengths of drawing lies in its ability to immediately reflect back to the person drawing the ideas that are revealed. In Gordon's drawing, I can almost see the dialogue that might have occurred between him, his drawing, and his ideas. This is perhaps why young children find drawing such a powerful tool. It is immediately holistic and interactive in ways that writing is not.

Examination of children's drawing in this study has revealed that children are able to represent complex ideas in their drawings. It has also revealed that

children are able to absorb information from the contexts in which they work and to assimilate and transform these new ideas through their drawings. However, the support, time, and opportunity for children to pursue complexity in their drawing also have to be part of the teaching and learning environment. The focus of the discussion around the drawing should be on the meaning and information it contains rather than on drawing skills and aesthetic qualities. This shifts the focus from a performance criteria to one that is concerned with the meaning that the children are trying to make of certain phenomena through their drawing. This approach opens a dialogue that actively involves children at a cognitive level. Drawings like those I have just described provide valuable insights into children's thinking and records of children's growth and development. I would suggest that when our focus is primarily on the meanings represented through drawing we could begin to see drawing as an invaluable teaching and learning tool.

Another example of drawing operating at an intrapersonal level can be seen in the video clip of Ryan drawing his light trap plans. In Ryan's initial drawing, the basic form for his light trap was laid out. He probably could have used this as a guide for building. However, in drawing this first plan he encountered a representational problem of how to show three dimensions. Using his first drawing as a foundation and his knowledge of blocks and block building he was able to maintain a dialogue between his drawing, his experience, and his ideas that caused him to develop a new representation. The transformation in his thinking about representation is evident in a new drawing where he draws the details of the inside of his light trap. Drawing offered the mediation required to

allow Ryan to form a new cognitive construction of a representation that was more complex than his original one. When drawing is viewed as a tool that is part of a meaning-making repertoire this helps teachers to see drawing as part of a learning process rather than as a product that is indicative of a more rigid stage of development. When the drawing skills involved become part of the child's struggle to articulate meaning then teachers can work with the child to clarify the meaning with the assumption that it may take several drawings to reach a desired level of understanding. Dean was very comfortable working his way through four different drawings in his search for the kind of light trap he wanted to build. As a teacher, I appreciated the drawing record he left of his thinking in process. It gave me an example of a child who had reflectively worked his way through an idea. It showed me that drawing had mediated between thought and action, and had provoked metacognition. These examples show that while it is important to draw at the interpersonal level it is worthwhile pursuing the cognitive complexity and abstraction that drawing seems to support at an intrapersonal level. This often means asking more from children through drawing. Interpersonal and intrapersonal levels would then operate in an integrated and recursive and ongoing cycle building more complex concepts and representational repertoires.

When I look at Ed's drawings over the three-month period of the study, I can see a historical and developmental progression. Each successive drawing seems to relate to and build upon the previous drawings. If we think of drawing involving many steps and perhaps many drawings in the pursuit of an idea, this opens possibilities for children using drawing over again in many different ways

and contexts. One of the qualities of drawing is its generative and divergent possibilities. I would caution against developing a series of steps that all children should follow in order to take the drawing process to higher levels of thinking. Tracing the qualitative changes in behaviour was important for Vygotsky's understanding of learning as a process of motion and change. In a similar way observations of these qualitative changes in drawing are important for our ongoing understanding of how children are learning. In this study, many of these qualitative changes became visible through the drawing process and the children's drawings. The changes took place within the social and cultural context of the classroom and as such were influenced by this.

Structural Level

"A child does not just become a thinker or a problem solver: she becomes a special kind of thinker, rememberer, listener, and communicator that is a reflection of the social context" (Bodrova & Leong, 1996).

In the context of the school setting, ideas and ways of processing information are shared amongst the teachers and children. The materials, spaces, time, and the social contexts that are offered and constructed in the classroom have direct implications for, and influences on learning that occurs. In this study, I tried to make available opportunities for drawing and to support drawing through the provision of interesting and high quality drawing materials. The presentation of these materials and the spaces set aside for their use promoted drawing in a social context. Not only were the children able to exchange ideas about the topic they were studying but they were also able to

support each other in the use of materials and different ways of using them. When the children worked together with drawing, the conversation often included commentary on the use of drawing materials and the representation processes, as in the case of the dialogue between Rick and Sean when they were drawing the wooden figures. When I valued collaborative work I structured my classroom space and materials in ways that supported this value position. Then much of the burden for learning was shifted from me, the teacher, and was shared among the whole class group. I believe that this provided a richer and more dialogic learning environment. When all the decisions about what to learn and how rested with me this seemed to deter children from becoming co-constructors of their own learning.

When the nature of the interactions between teacher and child, and child and child, are ones that encourage a dialogue about ideas, meaning, and learning then children hear that this is something their learning community values. When Ryan observed his peers planning and constructing light traps, he was inspired to do the same. Borrowing heavily from their ideas and processes, he set about designing his own trap. In this context Ryan knew that observing, borrowing, and co-constructing his understanding were learning strategies that were valued and supported. When Amy brought her letters from her uncle, she did so believing that they would contribute to the ongoing explorations of the whole class. When Gordon shared his experiences about getting his photograph taken and his theories about how the lights worked he did so believing that his peers would be interested and that this information was relevant to our ongoing

investigations. Strategies for learning, thinking, and using drawing as a meaning-making tool had been modelled and talked about individually, in small groups, as well as in large group discussions. This approach to learning recognises the particular skills and experiences each child brings to the learning situation and works to involve the child in a continuous dialogic spiral where the collective understanding and discussions work to support individual constructions. In this study, I have found that drawing has functioned well as part of this dialogic model.

General Cultural and Social Level

The study of cameras and photographers was linked to experiences outside of school and the wider cultural community by inviting a photographer into the classroom to share details of his profession with the children. Our visit to a photography studio helped children see connections between what they learn in school and what happens outside of school. When children experience these connections they see some relevance for their learning as well as how the information they process in the classroom connects with the community at large.

Visits to locations outside the classroom are valuable if active links between school and community are emphasised. The information collected on these visits can be brought back, revisited, and processed in more depth. Drawing was the medium of data collection and transfer of information in this study. Rather than visits aiming to summarise learning that had already taken place at the culmination of a study the visits I made with the children outside the classroom were springboards for further investigation. It was fieldwork in an

anthropological sense. We went equipped with clipboards, cameras, and questions. Information was gathered on these visits with the understanding that it would be used in our ongoing investigations in the classroom. Drawing was invaluable for field notes and for focusing children's attention. Fieldwork linked what the children did in school with the community at large. In the video clips of children constructing a photography studio there are examples of how drawing assisted the children with the transfer of information from the field visit to use in the classroom. The children brought not only information about the physical objects, they also brought information about the less visible structures and organisation of processes from their visit. As they worked to construct a photography studio of their own and define their roles in relation to each other, they were able recall elements of the organisation of a studio through their drawings. Roles and responsibilities were negotiated through the working drawings and plans they made for their studio. These play roles linked their learning to supraempirical structures in the wider community. Drawing was a critical element in this linkage. While each drawing was individually constructed and contained a personal understanding collectively the drawings mediated these more personal meanings and helped to move the children to more generalized understanding of their experiences.

Examples of symbolic images are probably more prevalent today than they have been at any time previously. Interfaces with technology tend to be image based while media like film, television, and the Internet that carry current ideas and information are also primarily image based. Acknowledging this image

rich, lived experience of children in schools is important if children are to see school as relevant to their experiences outside of school. In this study I was able to see some of the creative ways the children brought their out-of-school experiences into the classroom through their drawings (e.g. when Mark and Ryan used "arrow keys" to represent movement between, when Susan suggested using "cutaway" to show inside and when the children in the play studio created pictorial symbols to indicate the operation of equipment and use of the space).

2. What Is The Relationship Between Thought and Drawing?

"It is in meaning (that the) answers to our questions about the relationship between thought and speech can be found" (Vygotsky, 1962, p. 5).

In this study, I have explored the notion that it is in meaning that the answers to our questions about the relationship between drawing and thought can be found.

Vygotsky cautioned us against any elemental analysis. He developed a method that analysed the "unit," i.e. word meaning. As I have described in Chapter Three, Vygotsky used the metaphor of a water drop to explain what he meant by a unit. By analysing whole drawing events, as well as sequences of drawing events, I have tried to be true to his method and have examined drawing meaning as a unit rather than as elemental parts (Vygotsky, 1962).

Vygotsky wrote about two forms of meaning, meaning as reference and abstraction and meaning as contextualized personal sense. The first form of meaning refers to language meaning as the referential relationships between

signs and objects. The second form of meaning is that of the development of increasing generalization and abstraction in a concept (Wertsch, 2000).

Our understanding and recognition of how these two forms of meaning unfold are dependent on our understanding of the child's spontaneous concept and the child's scientific concept. The spontaneous concept refers to the child's first encounter with the experience. It is here that the referential use of language plays an important role in orienting the child to the concept. "In contrast, the birth of the scientific concept begins not with the immediate encounter with things, but with a mediated relation to the object" (Vygotsky, 1987, p. 219). For Vygotsky the primary means of mediation was language.

If I consider drawing to be a communication system that supports meaning and that might operate in similar ways to language, and if I replace the word "language" with the word "drawing" in the above hypothesis then I can begin to understand how drawing might function at the referential level as well as be a mediator between a child's spontaneous concept and a child's scientific concept.

At the spontaneous referential level drawing mediates between object and concept to identify the object. A symbol is created that stands for the object. In this way, the child is using drawing to move from the object to the concept. In my Grade 1 classroom our initial encounters with an experience or object in our exploratory drawings might be classified as the first abstractions and referents to the things we were studying, e.g. flashlights and cameras. These drawings oriented the children towards a concept. For example, when Ed encountered the switch on the flashlight he initially connected this new experience with his

understanding of the concept of "on" and "off" and created a drawing that represented or symbolized, "on" and "off." He worked from the object, the flashlight, to the concept of "on/off."

For Ed, the growth, or as Vygotsky says the birth, of the scientific concept can be seen in the different levels of light possible for this flashlight and in his new representation of the switch. He was challenged by a classmate to rethink his concept of "on" and "off" to include a range of levels of "on." From this concept his new drawing, or modification to his original drawing, emerged in the form of a three-way switch. Ed's initial drawing acted as a reference between the object and the concept of "on" and "off." Ed's revised and refined drawing of the switches mediated between his original concept of "on/off" and moved him towards an increased generalization of degrees of "on" and a broadening of his initial concept. "With the scientific concept, he is forced to follow the opposite path - from the concept to the thing" (Vygotsky, 1987).

The key to understanding the difference between an everyday spontaneous concept and a more scientific concept is the presence or absence of a system. The presence of a system facilitates supraempirical connections between concepts. (Vygotsky, 1987).

In my analyses, I found examples of drawing that seemed to be operating at a spontaneous, referential level. I also found examples of drawing mediating between the initial concept and the growth of scientific concepts and supraempirical connections. There were many examples in my analyses where drawing provided the vehicle by which the child was able to create a referential

symbol and then construct a contextualized personal concept and move to a more complex level of thinking or a more conceptual level of thinking.

Vygotsky states that it is not enough to have labels for objects in order to think and solve problems. What is also needed is the ability to manipulate these labels across contexts that will allow for connections that promote thinking at a more abstract and conceptual level. The ability to manipulate labels across context is, however, dependent upon the child's adequate understanding of the concept. The acquisition of word labels does not necessarily presume a clear understanding. What he suggests is needed is a working or experiential understanding (Vygotsky, 1962).

The creation of a drawing is an experience that is more complex than the appropriation of a word label that can be heard and memorized for recitation. In the creation of a drawing there is already involved all of the child's past and present experiences as well as their imagination and emergent thinking. Drawing simultaneously involves memory, experience, imagination, and observation. The creation of a drawing demands an integration of these elements. When children acquire word labels the acquisition tends to begin at a referential and recitation level. Integration at an experiential level is, I believe, what Vygotsky meant when he talked about the simultaneity of thought (Vygotsky, 1987) (as discussed in Chapter Three). Ed's drawing of the flashlight brought together his past experiences and memories of flashlights and combined this with his observations and understandings of the new flashlight as they occurred to him. His imagination and his drawing helped him to reformulate his old ideas to accommodate the new

ones. In the creation of a drawing there is a possibility of processing an idea as it emerges. A drawing is both an experiential and a working understanding. Ed produced one drawing of a flashlight that contained many different experiences, processes, ideas, and concepts simultaneously. The simultaneity of a drawing as a part of thought could be the most essential quality that makes drawing such a powerful meaning-making tool for the child. The simultaneity of a drawing more closely resembles a thought than a word. "Thought is always something whole, something with significantly greater extent and volume than the individual word" (Vygotsky, 1987, p. 281).

When I consider Ed's drawings as a sequence, for example his shadow drawings, the information-rich simultaneity of each drawing allows me to see the connections between the concepts Ed was working with across contexts. I believe the drawings also helped Ed to see connections across contexts. He began with a simple observation drawing of the shadows of a bike rack. This close observation or reference to an object revealed a discrepancy between the object and its shadow. This discrepancy raised questions that he then worked to resolve. Each drawing reveals Ed's train of thought, his connections across contexts and his increasing generalization. Beginning with his bike rack shadow, then moving onto the shadows of his model and then the shadows of the wooden figures, each drawing was building on the previous one over time. These drawings kept Ed continually moving on to higher more complex and more abstract levels of thinking. He was broadening his understanding of shadow so

that it was no longer a direct reference between object and shadow but rather concepts of shadows among many shadows and increasing generalizability.

If I had taken the children out to see shadows and we had looked at them and discussed them, I could have assumed that because the children could talk to me about the shadows using the same words as I did that they had the same understanding of shadows that I did. However, when I look at the children's drawings of shadows I can see many different interpretations of shadows that do not match my understanding and do not even provide similar or consistent alternative understandings of shadows. Because drawing involved the constant invention of symbols I was able to see specific children's thinking more clearly. Looking at their drawings and using the drawings as reference points for discussion highlights the various different concepts. Linking thought and drawing as I have has helped me to recognise that meaning and understanding can be facilitated through drawing and that drawing can play a significant role in the growth and development of children's thinking and education.

3. Can Drawing Be an Activity That Leads Development?

Leont'ev's definitions for "leading activities" overlap for the children in this study. Both play and learning might be considered leading activities for this age group. At the beginning of this chapter I provided many examples of how drawing assisted learning and led development. I gave examples of theoretical reasoning, the emergence of more abstract mental functions and the intrinsic motivation in children that are the developmental accomplishments that accompany learning

as a leading activity. In this section, I will focus primarily on drawing's relationship to play and how drawing functions in the context of play.

When we consider play as a leading activity the corresponding developmental accomplishments are imagination, symbolic functioning, and the integration of emotions. While Leont'ev positions play as the leading activity at the level of pre-school I consider play to be something that continues throughout life, albeit taking different forms.

In this study, there were several examples of drawing being used specifically in a play context during the building and use of the photography studio in the classroom. The children in this scenario were faced with the task of translating the information gathered on their field visit into a working model of a photography studio. Drawing was instrumental in this translation process. When the children drew how they thought the studio should be built, they had to match their field experiences with what they drew. They could not just draw any structure. They had to keep in mind critical factors like how far the camera was from the subject and represent this in their drawing in such a way as it was clear to others who might build it. They had to translate the height of the camera to one that would function in their context. Anton drew a child next to his camera structure to indicate not only how high the camera had to be but also which blocks might most easily be used. The linking of symbols to function was a complex task that challenged the children to restructure old ideas and create new ones that would operate within the context of their play.

Drawing was instrumental in helping the children to imagine how the studio might be built as well as providing a common understanding amongst the participants. When discussing each other's drawings they were able to see inconsistencies between ideas and work to resolve them. Rick had assumed that they would be using small blocks while the other two had assumed they would be using hollow blocks and small blocks. Drawing provided a bridge between individual understandings and a common working model. Having the drawings to refer to during the planning phase helped the children step back from their individual emotional attachment to an idea. The children saw the drawing as a flexible plan that preceded a collaborative activity. In this way, the drawing mediated between intense emotional attachments to individual ideas and a more collaborative construction. At this paper planning stage it seemed easier for children to negotiate roles and responsibilities. Using drawing as a strategy to mediate ideas and roles in play proved very successful in helping the children in this study collaborate with each other. It also helped children who were more impulsive to monitor their behaviour while giving quieter children a voice. As the video clip showed, other children quickly adopted drawing as a way of negotiating play roles. Susan, who desperately wanted to join the group, was able to use drawing to define a role for herself that matched the play event that was in progress. Those who have worked with play in the classroom will recognise that the hardest part for children is a successful entry into an already existing play event. In these ways, I see drawing leading development in the

context of play. It is a strategy I would recommend for teachers who find that play often becomes chaotic and purposeless with certain groups of children.

4. How Can Drawing Function As a Tool For Learning?

Understanding how the zone of proximal development operates in the context of drawing continues to challenge me. Thorpe and Gallimore's (1988) four-stage recursive cycle with its emphasis on performance is something that I find hard to reconcile with the process of drawing. Performance implies a convergent end goal yet one of drawing's strengths is its divergence. If I were to use aesthetic criteria for evaluating performance in drawing then perhaps the emphasis on performance would be less problematic. However, aesthetic criteria would have limited the range of drawing available to the children in this study. It would also have changed the nature and the use of drawing.

There were many examples of drawing being assisted by more capable others. The range of assistance that children offered each other was remarkable. From the casual comment to sharing of ideas to sharing the page and pencil. There were many examples of self talk while drawing which would indicate a dialogue with self or self help, as well as an evaluative stance that children took in relation to their own drawing. Not only were there examples of fluency and automatization but there were also examples of de-automatization. As a classroom teacher who is interested in children acquiring a wide range of drawing skills and applications across the curriculum the flexibility and open ended possibilities that drawing can provide is something that I value. Within our classroom community ideas for representation were shared, discussed, and

modelled. When every drawing was valued for its contribution to learning the range of drawing that was acknowledged and used seemed limitless.

I learned much from watching children support each other. Rick, in particular, seemed to have the skills to work with his peers in a productive manner. In the video clip of him drawing alongside Sean you can see him quietly take over Sean's drawing when frustration sets in. He adds just enough to the drawing to allow Sean to move to the part of drawing he wants to work with, the recording of the shadows. You can see how Sean reclaims his drawing and moves straight to work on representing the shadows and hear him talking to himself as he does it. Listening to his self-talk I get a glimpse of the kind of feedback drawing is giving children. He sees in his drawing not just the meaning it contains for him but also some of the other meanings it might contain. In this case, he works to resolve ambiguity. Yet, in his next drawing where he makes large feet and legs on his figure he is content to let the ambiguity sit there. Providing a social context that supports the interactions and sharing of ideas amongst children as they draw seemed to be an important factor in this study. Talking with children about the different drawing difficulties and some of their solutions as well as the nature of the help the children gave each other allowed them to know about a wider range of strategies they could bring to the task of drawing.

Zebroski's (1994) metaphor of the tidal wave was a very useful way to think about drawing in this study. While working on our topics of cameras I became aware of just how much the children reviewed their work and built on

previous ideas. This reviewing often led to restructuring and new ideas as in the case of Gordon's drawing of the lights. It is not so much a question of being stuck as I had previously thought but rather a revisiting of an idea in a different context or time so that we see a new idea emerge. This was also evident in the many different drawings Rick did of the wooden figures. Each drawing seemed to have a different approach and different intent. Rick's reviewing of his drawings seemed to help him put all the pieces of his understanding about shadows together. He was able to recognise that there are many different ways of seeing and of representing one thing. Studying the wooden figures in this singular way lent some depth to Rick's understanding of representation of shadows. One of the great strengths of drawing lies in its ability to help us see more. Our world is so visually stimulating that we are often not able to see very carefully. When we draw something, we have to pay much closer attention to it. When we do this, we become aware of things we had not noticed before. Asking children to draw something is like asking them to pay closer attention to something. When we pay close attention to something it becomes more important to us and we try to connect it to the rest of our understanding.

When a child is drawing and paying close attention to something it is easier to engage in a meaningful and focused dialogue. If the dialogue is responsive to the things the child is paying attention to and at the same time works to draw the child's attention to things they have overlooked then I think I can work within the zone of proximal development in ways that support the child's efforts while at the same time moving them to the next level. The dialogue then

becomes more than a comment about the drawing but an in-depth conversation about what the child is trying to do through the drawing. It is a dialogue that works to support and extend the concept the child is working with. This way of interacting with children around their drawing is similar to Rogoff's description of responsive.

When I review the video clip of Gordon and Mark's discussion about how a light trap should be built I can see a co-constructive dialogue taking place between the children. This is what Newman, Griffin, and Coles (1989) describe as a construction zone. As they put their heads together over Mark's drawing explanation and negotiation I get a sense of two children working together to try to understand each other's thinking. This happened again when the children came together to plan the photography studio. The three children worked hard to not only make their ideas clear but to also understand the other's ideas and negotiate a common plan. In both cases, the children worked to keep the dialogue open and to understand multiple points of view. The drawing they did in this context assisted them in their process of co-construction by helping the children clarify their ideas for themselves and each other. It is a dialogue that includes drawing as an integral part of the process. If we were to use drawing in this way more often we would probably see an increase in focused and transformative discussions that assist children with their learning.

When I consider the idea of what constitutes a more capable peer in the context of drawing, I also have to consider drawing as I have defined it and as I have found it used in this study. In this context, a more capable peer does not

necessarily mean someone who has better drawing skills. More capable means those children who were able to use drawing as a meaning-making tool. This perspective is inclusive of many different categories of drawing. It opens the door for both children and teachers to acknowledge the many different ways drawing can function in a classroom. Drawing should be a polyvocal activity that is valued in schools.

Selecting specific aspects of a contemporary learning theory that is part of the dominant discourse in early childhood and discussing it in relation children's drawing has been my way of constructing theories about how children use drawing to learn. I hope that I have helped other early childhood educators to look at drawing in relation to the theories that ground their practice and see the potential drawing holds for them. For those children for whom drawing is integral to their learning, I hope that I have adequately represented drawing as an important part of the learning process.

References

Ackerman, D. (1990). *A natural history of the senses.* New York: Vintage Books.

Adan, J. (1987). The child David: An attempt to understand and guide him through his difficulties. *Phenomenology + Pedagogy*, 5, p. 22-34.

Alexander, R. (1984). What are children doing when they create. *Language Arts*, 61(5), 478-479.

Alland, A. (1983). *Playing with form: Children draw in 6 cultures.*

Alteitner, H. and Leutner, D. (1996). Applying standard network analysis to hypermedia systems: Implications for learning in *The Journal of Educational Computing Research, 14:3.*

Altricher, H., Posch, P., & Somekh, B. (1993). *Teachers investigate their work.* London: Routledge.

Anderson, M. (1995). *Intelligence and development: a cognitive theory.* Oxford: Oxford University Press.

Anderson, K. T. (1999). Ethnographic hypermedia: Transcending thick descriptions. *SIGHTS - Visual Anthropology Forum.* http://cc.joensuu.fi/sights/kevin.htm

Arnheim, R. (1966). *Art and visual perception; a psychology of the creative eye.* Berkeley: University of California Press.

Arnheim, R. (1969). *Visual thinking.* Berkeley: University of California Press.

Arnheim, R. (1974). *Art and visual perception: A psychology of the creative eye. The new version.* Berkley and Los Angeles: University of California Press.

Banks, M. (1992). Which films are ethnographic films?, in P. I. Crawford and D. Turton (ed.) *Film as Ethnography.* Manchester: University of Manchester Press.

Banks, M. (1995). Visual research methods, *Social Research Update,* 11: 3

Barbash, I. & Taylor, L. (1997). *Cross cultural filmmaking: A handbook for making documentary and ethnographic films and video.* London: University of California Press.

Berger, J. (1972). *Ways of seeing.* London: British Broadcasting Association.

Berk, L. E. (1994). Vygotsky's theory: The importance of make believe play. *Young Children, 50* (1), 30-39.

Berk, L. E. & Winsler, A. (1995). Scaffolding children's learning: Vygotsky and early childhood education. *NAEYC Research and Practice Series, 7*. Washington, DC: National Association for the Education of Young Children.

Bodrova, E., Leong, D.J. (1996). *Tools of the mind - The Vygotskian approach to early childhood education*. Columbus, Ohio: Merrill/Prentice Hall.

Bourdieu, P. (1990[1965]). *Photography: A middle brow art.* Oxford: Polity Press.

Bremmer, J. G. & Moore, S. (1984). Prior visual inspection and object naming: two factors that enhance hidden feature inclusion in children's drawings. *British Journal of Developmental Psychology* 2, 371-76.

Brendekamp, S. & Copple, C. (1997). *Developmentally appropriate practice in early childhood programs. Revised Edition.* Washington, DC: National Association for the Education of Young Children.

Bronfenbrenner, U. (1979, 1989, 1993). *The ecology of human development: Experiments by nature and design.* Cambridge, Mass: Harvard University Press.

Brooks, M. (2001). *In touch*, Art exhibit.

Bruner, J. (1986). *Actual minds, possible worlds*. Cambridge: Harvard University Press.

Bruner, J. (1974). Organization of early skilled action. In M. P. M. Richard, *The Integration of the Child into A Social World.* London: Cambridge University Press.

Bruner, J. (1983). Vygotsky's zone of proximal development: The hidden agenda. *New Directions for Child Development, 23,* 93-97.

Bryant, P. (1974). *Perception and understanding in young children*. London: Methuen.

Burch, R. (1991). Phenomenology and human science reconsidered. *Phenomonology + Pedagogy*, 9, 27-69.

Burr, V. (1995). *An introduction to social constructionism.* London: Routledge.

Carson, T. R. (1986). Closing the gap between research and practice: Conversation as a mode of doing research. *Phenomonology + Pedagogy*, 4, 73-85.

Catalogue for the exhibition of works and writings from the Infant and Toddler Centres and Preschools of the City of Reggio Emilia, Italy. (1987). *The Hundred Languages Of Children.*

Cazden, C. B. (1981). Performance before competence: Assistance to child discourse in the zone of proximal development. *Quarterly Newsletter Of the Laboratory of Comparative Human Cognition, 3,* 5-8.

Chadwick, W. (1990). *Women, art, and society.* New York: Thames and Hudson.

Chan, V. (1995). *Rubens to Picasso, four centuries of master drawings.* Edmonton, Alberta: University of Alberta Press.

Chandler, D. (1997). http://www.aber.ac.uk/media/Modules/TF12710/visindex.html

Clay, M. (1992). *Becoming literate: The construction of inner control.* Portsmouth. N.H.: Heinemann Educational Books.

Cohen, E. P. & Gainer, R. S. (1976). *Art: Another language for learning.* Portsmouth, NH: Heinemann.

Cole, M. (ed.) (1971). *The cultural context of learning and thinking: An exploration in experimental anthropology.* New York : Basic Books.

Colbert, C. B. & Taunton, M. (1988). Problems of representation: Preschool and third grade children's observational drawings of three dimensional models. *Studies in Art Education. 29,* (2), 103-114.

Collier, J. & Collier, M. (1986). *Visual anthropology: Photography as a research method.* Albuquerque: University of New Mexico Press.

Conners, R. D. (1980). *Using stimulated recall in naturalistic settings - Some technical procedures.* University of Alberta: Centre for Research in Teaching.

Cook, G. (1998). *Teaching young children to draw: Imaginative approaches to representational drawing.* London; Bristol, PA: Falmer Press.

Costall, A. (1993). *Conflicting images of innocence and corruption in the valuation of child art.* In, A. M. Kindler, (Ed.). (1997) *Child Development in Art.* Reston, Virginia: National Art Foundation.

Cox, M. & Freeman N. H. (1985*). Visual order: The nature and development of pictorial representation.* New York: Cambridge University Press.

Cox, M. (1985). *Visual order :The nature and development of pictorial representation.* Ed., N.H. Freeman, M.V. Cox. Cambridge; New York: Cambridge University Press.

Cox, M. V. (1986). *The child's point of view.* Cambridge : Cambridge University Press.

Cox, M. V. (1991). *The child's point of view (2nd Ed.)* London: Harvester Wheatsheaf

Cox, M. V. (1993). *Children's drawings of the human figure.* Hove: UK: Erlbaum.

Cummings, P. (1992). *Talking with artists.* New York: Bradbury Press.

D'Ailly, H. (1992). Asian mathematics superiority: A search for explanations. *Educational Psychologist, 27,*(2), 243-261.

Davis, A. M. (1985). The canonical bias: young children's drawings of familiar objects. In Freeman, N., & Cox, M. *Visual Order: The Nature and Development of Pictorial Representation.* Cambridge: Cambridge university Press, 202-13.

Davis, J. (1997). The 'u' and the wheel of 'C': Development and devaluation of graphic symbolization and the cognitive approach at Harvard project zero. In Kindler, A. M., (Ed.). (1997) *Child Development in Art.* Reston, Virginia: National Art Foundation.

Dissanayake, E. (1992). *Homo aestheticus: Where art comes from and why.* New York: The Free Press, A Division of Macmillan.

Donaldson, M. (1978). *Children's minds.* London: Fontana Press.

Duffield, K. (1998). *Visual research methods.* http://www.spinworks.demon.co.uk/pub/visual.htm

Duncum, P. (1984). How 35 children between 1724 and 1900 learned to draw. *Studies in Art Education,* 26 (2), 93-102.

Duran, R. P. & Syzmanski, M. H. (1995). Co-operative learning interaction and construction of activity. *Discourse Processes, 10,* (1), 149-164.

Edwards, B. (1989). *Drawing on the right side of the brain.* New York: Tarcher Putnam.

Edwards, C. P. Gandini, L. & Forman, G. (Eds.). (1998). *The Hundred Languages of Children: The Reggio Emilia Approach to Early Childhood Education.* Norwood, NJ: Ablex Pub. Corp.

Edwards, E. (1992). *Anthropology and photography.* New Haven, CT: Yale University Press.

Eisner, W. E. (1972). *Educating artistic vision.* New York: Macmillan

Eisner, W. E. (1988). *The value of art in education.* Video for the Getty Center for Education in the Arts.

Elliott, J. (1991). *Action research for educational change.* Bristol: Open University Press

Emme, M. J. (1999). Unruly research: Visuality in the academy, *Canadian Review of Art Education,* 26(1), 36.

Fein, S. (1993). *First drawings: Genisis of visual thinking.* Pleasant Hill, CA: Exelrod Press.

Franck, F. (1973). *The zen of seeing.* New York: Simon and Schuster.

Freedman, K. (1997). Artistic development and curriculum: Sociocultural learning considerations. In, A. M. Kindler, (Ed.). (1997) *Child Development in Art.* Reston, Virginia: National Art Foundation.

Freeman, N. H. (1980). *Strategies of representation in young children: Analysis of spatial skills and drawing processes.* London: Academic Press Inc.

Freeman, N. H. & Cox, M. (1985). *Visual order.* Cambridge, Eng. : Cambridge University Press.

Friere, P. (1998). *Pedagogy of freedom: Ethics, democracy, and civic courage.* Langham, MD: Rowman & Littlefield.

Gadamer, H. (1975). *Truth and method.* New York: Seabury Press.

Gadamer, H. (1986). *The relevance of the beautiful and other essays.* Cambridge: Cambridge University Press.

Gallagher, S. (1992). *Hermeneutics and education.* New York: State University of New York.

Garbarino, J. (1992). *What children can tell us.* New York: Jossey Boss.

Gardner, H. (1980). *Artful scribbles: The significance of children's drawing.* NY: Basic Books.

Gardner, H. (1982). *Art, mind and society.* New York: Basic Books.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Gardner, H. (1991). *The unschooled mind.* New York: Basic Books.

Gardner, H. (1993). *Multiple intelligences.* New York: Basic Books.

Gardner, H., Howard, V., & Perkins, D. (1974). Symbol systems: A philosophical, psychological and educational investigation. In D. Olsen (Ed) *Media and symbols* (pp. 27-55). The Seventy-Third Yearbook of the National Society for the Study of Education, Chicago: University of Chicago Press.

Garvey, C. (1986). Peer relations and the growth of communication. In, E. C. Mueller & C. R. Cooper (Eds.), *Process and Outcome in Peer Relations* (pp. 329-344). San Diego, CA: Academic Press.

Gaskell, J., Fleming, R., Fountain, R., & Ojelel, A. (1995). *Socioscientific issues,* BC Assessment of Science Technical Report 111.

Gergen, K. J. (1985). The social constructionist movement in modern psychology. *American Psychologist* 40:309-320

Getzels, J. W. & Csikszentmihali, M. (1976). *The creative vision: A longitudinal study of problem finding in art.* New York: John Wiley and Sons.

Gibson, J. J. (1979). *The ecological approach to visual perception.* Boston, MA: Houghton Mifflin.

Ginnsberg, H. P. & Opper, S. (1988). *Piaget's theory of intellectual development* (3rd ed.) Englewood Cliffs, NJ: Prentice hall.

Reggio Children, Calgary. (1997). Location: Glenbow Museum, Calgary, Alberta, Canada.

Glyn, V. & Silk A. M. J. (1990). *An introduction to the psychology of children's drawings*. New York: Harvester Wheatsheaf.

Goldman - Segall, R. (1998*). Points of viewing children's thinking: A digital ethnographers journey*. Lawrence Erlbaum Associates, Publishers, Mahwah, New Jersey. http://www.pointsofviewing.com.

Golomb, C. (1989). *The child's creation of a pictorial world: Studies in the psychology of art*. Berkeley, CA: University of California Press.

Golomb, C. (1992). *The child's creation of a pictorial world*. Berkeley and Los Angeles: University of California Press.

Golomb, C. (1994). Drawing as representation: The child's acquisition of a meaningful graphic language. *Visual Arts Research,* p. 14-27.

Golomb, C. (2002). *Child art in context: A cultural and comparative perspective*. Washington, Dc: American Psychological Association.

Goodman, N. (1976). *The languages of art*. Indianapolis: Hackett.

Goodman, N. (1978). *Ways of wordmaking*. Indianapolis, IN: Hacket Publishing Co.

Goodnow, J. (1977). *Children drawing*. Cambridge, MA : Harvard University Press.

Gore, J. M. (1993). *The struggle for pedagogies: Critical and feminist discourses as regimes of truth*. New York: Routledge.

Gredler, M. E. (1997). *Learning and instruction: Theory into practice*. Upper Saddle River, NJ: Prentice-Hall.

Grumet, M. R. (1986). Existential and phenomenological foundations of autobiographical methods. In, Pinar & Reynolds, *'Curriculum as Phenomenological Deconstructed Text'*. CA: University of California Press.

Guggenheimer, R. (1960). *Creative vision*. London: Harper.

Harper, D. (1998). An argument for visual sociology, in J. Prosser (Ed.), *Image Based Research: A Source Book for Qualitative Researchers.* London: Falmer Press.

Heidegger, M. (1977*). The question concerning technology and other essays.* New York: Harper and Row.

Heider, K. (1976). *Ethnographic film.* Aystin: University of Texas Press.

Heshusius, L. (1994). Freeing ourselves from objectivity: Managing subjectivity or turning toward a participatory mode of consciousness? *Educational Researcher 23, No 3, 15-22.*

Howard, A. (1988). 'Hypermedia and the future of ethnography', *Cultural Anthropology,* 3(3): 387-410.

Hruby, G. G. (2001). Sociological, postmodern, and new realism perspectives in social constructionism: Implications for literacy research. *Reading Research Quarterly, 36*(1), 48-62.

Hubbard, R. (1989). *Authors of pictures, draftsmen of words.* Portsmouth, NH: Heinemann.

Hultgren, F.H. (1991). The student teacher as person: Reflections on pedagogy and being. *Phenomonology + Pedagogy.* 9, 33-46.

Hurwitz, A. (1983). *Drawing for the schools.* Catalogue for the Conference. Maryland Institute, College of Art.

Isaak, J. A. (1996). *Feminism and contemporary art.* London: Routledge.

Jenks, C. (1995). *Visual cultures.* London: Routledge.

John-Steiner, V. (1997). *Notebooks of the mind: Explorations of thinking.* Oxford: Oxford University Press.

Katz, L. G. & Chard, S. C. (1989*). Engaging children's minds: The project approach.* Norwood, N. J.: Ablex.

Kellogg, R. (1967). *The psychology of children's art.* CRM: Random House.

Kellogg, R. (1969). *Analyzing children's art.* Palo Alto, CA: National Books Press.

Kemmis, S. and McTaggart, R. (1981). *The action research planner.* Victoria: Deakin University.

Kindler, A. M. (1996). From end points to repertoires: A challenge to art education. *Studies In Art Education.*

Kindler, A. M. (Ed.) (1997). *Child development in art.* Reston, Virginia: National Art Foundation.

Kindler, A. M. & Darras, B. (1997). A map of artistic development. In A. M. Kindler, (Ed.). (1997) *Child Development in Art.* Reston, Virginia: National Art Foundation.

Koroscik, J. S. (1997). What potential do young people have for understanding works of art. In, A. M. Kindler, Ed., (1997). *Child Development in Art.* Reston, Virginia: National Art Foundation.

Langer M. M. (1989). *Merleau-Ponty's phenomenology of perception: a guide and commentary.* Tallahassee, Fla.: State University Press.

Lark-Horowitz, B., Lewis, H. & Luca, M. (1967*). Understanding children's art for better teaching*, Columbus, Ohio: Merrill.

Lather, P. (1981). Issues of validity, in *Interchange 17, No. 4 78*

Lauquet, G. H. (1927). *Le dessin enfantin.* Paris: Alcan.

Lee, C. D. & Smagorinsky, P. (Eds.). (2000). *Vygotskian perspectives on literary research: Constructing meaning through collaborative inquiry.* Cambridge University Press.

Leont'ev, A. (1977/78). *Activity, consciousness, and personality.* Englewood Cliffs, NJ: Prentice-Hall.

Loizoz, P. (1994). *Innovation in ethnographic film.* Manchester: Manchester University Press.

Lomax, H. & Casey, N. (1998). Recording social life: Reflexivity and video methodology. *Sociological Research Online,* 3(2), http:// www. socresonline.org.uk/socresonline/3/2/1.html

London, P. (1989). *No more second hand art: Awakening the artist within.* Boston: Shambhala.

Lowenfeld, V. (1943). *Creative and mental growth.* New York: Macmillan.

Lowenfeld, V. (1947). *Creative and mental growth: A textbook on art education.* New York: Macmillan

Lowenfeld, V. (1975). *Your child and his art.* New York: Macmillan.

Lyon, http://anthropology.ac.uk/Bhalot

Lytle, S. L. & Cochran-Smith, M. (1990). Learning from teacher research: A working typology. *Teachers College Record* , Vol. 92, Fall 1990.

MacDougall, D. (1975). Beyond observational cinema. In, P. Hockings, (ed.) *Principals of visual anthropology,* 2nd. Ed., Berlin and New York: Mouton de Gruyter.

McFee, J. (1957). *Preparation for art.* San Fransisco: Wadsworth Pub. Co.

McGuigan, J. (Ed.). (1997). *Cultural methodologies.* London:Sage.

McLuhan, M. (1967). *The medium is the massage.* New York: Bantam Books.

Meadows, S. & Cashdan, A. (1988). *Helping children learn.* London:Fulton.

Merleau-Ponty, M. (1964). *Sense and non-sense.* North Western University Press.

Merleau-Ponty, M. (1964). *The primacy of perception : And other essays on phenomenological psychology, the philosophy of art, history, and politics.* Evanston, IL: Northwestern University Press.

Meskimmon, M. (1996). *The art of reflection: Women artists self-portraiture in the twentieth century.* New York: Columbia University Press.

Messer, D. & Miller, S. (Eds). *Exploring developmental psychology.* London, Sydney, Aukland: Arnold

Mirzoeff, N. (1995). *Bodyscape.* London: Routledge.

Moll, L. (1990). *Vygotsky and education.* New York: Cambridge University Press.

Moll, L. (2002). Inspired by Vygotsky: Ethnographic experiments in education. In C. D. Lee & P. Smagorinsky (Eds.), *Vygotskian perspectives on literacy research: Constructing meaning through collaborative inquiry.* (pp. 256-268). New York: Cambridge Universtiy Press.

Montgomery-Whicher, R. (1997). *Drawing: A phenomenological inquiry.* University of Alberta: Unpublished Doctoral Thesis.

Nachmanovitch, S.(1990). *Free play.* New York: G. P. Putnam's Sons.

Newman, D., Griffin, P. & Cole, M. (1989). *The construction zone: Working for cognitive change in school.* Cambridge, UK: Cambridge University Press.

Newton, C. & Kantner, L. (1997). Cross-cultural research in aesthetic development: A review. A. M. Kindler, Ed. (1997*). Child Development in Art.* Reston, Virginia: National Art Foundation.

Nicolaides, K. (1941*). The natural way to draw: A working plan for art study.* Boston: Houghton Mifflin Company.

Nielsen H. B. (1994). Seductive texts with serious intentions. *Educational Researcher.*

Nutbrown, C. (1994). *Threads of thinking.* London: Paul Chapman Publishing.

Okley, J. (1994). Vicarious and sensory knowledge of chronology and change: Ageing in rural France. In, K. Hastrup and P. Hervik (eds.), *Social experience and anthropological knowledge.* London: Routledge.

Olson, J. L. (1992). *Envisioning writing - towards an integration of drawing and writing.* Portsmouth, NH: Heinemann.

Paine, S. (1981). *Six children draw.* London: Academic Press.

Pariser, D. (1984). The juvenalia of Klee, Toulouse-Lautrec and Picasso: A report on the initial stages of research into the development of exceptional graphic artistry. In B. Wilson and H. Hoffa (Eds.) *The History of Art Education.* State College PA: Pennsylvania State University.

Parson, M. (1998). Book review. *Studies in art education: A journal of issues and research.*40(1) 80-91.

Piaget, J. (1956). *The child's conception of space.* New York:Macmillan.

Piaget, J. & Inhelder, B. (1969). *The child's conception of space.* London: Routledge and Kegan Paul.

Picard, D & Vinter, A. (1999). Representational flexibility in children's drawings: Effects of age and verbal instructions. *British Journal of Developmental Psychology*17, 605-622.

Piirto, J. (1992). *Those who create.* Ohio: Ohio Psychology Press.

Pink, S. (2002). *Doing visual ethnography.* London: Sage Publications.

Polakow, V. (1985). Who's stories should we tell?. *Language Arts,* Volume 60, Number 8, December 1985.

Pollard, A. (1987). *Children and their primary schools.* London: Falmer Press.

Prosser, J. (Ed.). (1998). *Image based research: A sourcebook for qualitative researchers.* T.J. International Ltd, Great Britain.

Prosser, J. & Banks, M. (1996). What constitutes an imaged based methodology? *Visual Sociology,* 11(2): 26-34.

Reason, P. (1988). *Human enquiry in action: Developments in new paradigm research.* London: Sage Publications Ltd.

Ricoeur, P. (1991). *A Ricoeur reader: Reflection and imagination.* Toronto: University of Toronto Press.

Rogoff, B. (1986). Adult assistance of children's learning. In T. E. Raphael (Ed.), *The context of school based literacy.* New York: Random House.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context.* New York: Oxford University Press.

Ruby, J. (1996). Visual anthropology. In *Encyclopedia of cultural anthropology.* Levinson D. & Ember M. (Eds). New York. Henry Holt and Co. Vol. 4:1345-1351.

Ruby, J. (2000). *Picturing culture.* Chicago and London: The University of Chicago Press.

Salome, R. (1965). The effects of perceptual training upon the two dimensional drawings of children. *Studies in Art Education,* Z(1) 15-21.

Salome, R. A. & Reeves, D. (1972). Two pilot investigations of perceptual training of four and five year old kindergarten children. *Studies in Art Education.* 13, 2, 3-10

Smith, N. (1983). Drawing conclusions: Do children draw from observation? *Art Education.* 36 (5), 22-26.

Smith, N. R. (1998). *Observational drawing with children: A framework for teachers.* New York: Teachers College Press.

Smith, P. M. (1999). The development of pictorial representation. In D. Messer & S. Miller, (Eds). *Exploring Developmental Psychology.* London, Sydney, Aukland: Arnold

Smith, R. A. (1989). *The sense of art - a study in aesthetic education.* New York: Routledge.

Smith, R. A. (1994). *General knowledge and arts education - An interpretation of E.D. Hirsch's cultural literacy.* Urbana: University of Illinois Press.

Spurling, L. (1977). *Phenomenology and the social world.* London: Routledge and Kegan Paul.

Strathearn, M. (1991). *Partial connections*, Rowman & Littlefield Publishers Inc.

Strecker, I. (1997). The turbulence of images: On imagery, media and ethnographic discourse, *Visual Anthropology,* 9: 207-27.

Strommen, E. (1989). A century of children drawing: The evolution of theory and research concerning the drawings of children. *Visual Arts Research.* Vol 14(2)[28] 13-24

Tharp, R. G. & Gallimore, R. (1988). *Rousing minds to life: Teaching, learning and schooling in social context.* Cambridge: Cambridge University Press.

Thomas, G. V. & Silk, A. M. J. (1990). *An introduction to the psychology of children's drawings.* NY: Harvester Wheatsheaf

Thompson, C. M. (Ed.). (1995). *The visual arts and early childhood learning.* Reston, Virginia: The National Art Education Association.

Tuckwell, N. B. (1979). *Stimulated recall: Theoretical perspectives and practical and technical considerations.* Edmonton: Centre for Research in Teaching.

van Manen, M. (1984). Practicing phenomenological writing. *Phenomenology + Pedagogy*, 2, 36-54.

van Manen, M. (1986). *The tone of teaching.* Toronto: Scholastic.

van Manen, M. (1990). *Researching lived experience.* London, Ont.: Althouse Press.

van Manen, M. (1991). *The tact of teaching.* London, Ont. : Althouse Press.

Vygotsky, L. S. (1962). *Thought and language.* Cambridge, Massachusetts: The M.I.T. Press

Vygotsky, L. S.,(1971). *The psychology of art.* Cambridge, Massachusetts: M.I.T. Press.

Vygotsky, L. S. (1978). *Mind in society.* Cambridge, Massachusetts: Harvard University Press.

Vygotsky, L. S. (1986). *Thought and language.* Cambridge, Massachusetts: The M.I.T. Press

Vygotsky, L. S. (1987). *The collected works of L. S. Vygotsky* (N. Minik, Trans. Vol. 1). New York: Plenum.

Vygotsky, L. S. (1997). *Educational psychology.* (R. Silverman, trans.). Boca Raton, FL: St. Lucie.

Wales, R. (1991). Children's pictures. In R. Grieve, (Ed.). *Understanding children: Essays in honor of Margaret Donaldson.* Oxford: Basil Blackwell, Inc.

Walker, R. & Lewis, R. (1998). Media convergence and social research: The Hathaway project. In, *Prosser J., (1998). Image-based Research: A Sourcebook for Qualitative Researchers. Falmer Press, London*

Warner, S. (1989). *Encouraging the artist in your child (even if you can't draw).* New York: St. Martin's Press.

Wells, G. (1993). *Constructing meaning with children.* New York: McGraw Hill Press.

Wells, G. (2000). Dialogic inquiry in education: Building on the legacy of Vygotsky. In, C. D. Lee & P. Smagorinsky, (Eds.). (2000). *Vygotskian Perspectives on Literary Research: Constructing Meaning through Collaborative Inquiry.* Cambridge University Press.

Wertsch, J. (1985). *Vygotsky and the social formation of mind.* Cambridge, MA: Harvard University Press.

Wertsch, J. (2000). Vygotsky's two minds on the nature of meaning. In, Lee, C. D. & Smagorinsky, P. (Eds.). (2000). *Vygotskian Perspectives on Literary*

Research: Constructing Meaning through Collaborative Inquiry. Cambridge University Press.

Wheeler, G. (2000). *Learning in context [videorecording] : Probing the theories of Piaget and Vygotsky / the Open University.* Princeton, NJ : Films for the Humanities & Sciences

Wilson, B. & M. (1977). An iconoclastic view of the imagery sources in the drawings of young children. *Art Education*, 30.

Wilson, M. & Wilson, B. (1982). *Teaching children to draw: a guide for teachers and parents.* NJ: Prentice-Hall Inc.

Wilson, B. & M., & Hurwitz, A. (1987). *Teaching drawing from art.* Worcester, MA: Davis Publications.

Winer, Marc S. A. (1977). *Drawing, the creative process.* New York: Fireside.

Wink, J. & Putney, L. (2002). *A vision of Vygotsky.* Boston: Allyn and Bacon.

Winner, E. (1982). *Invented worlds: The psychology of the arts.* Cambridge: Harvard University Press.

Wolf, D. & Perry, M. (1988). From endpoints to repertoires: New conclusions about drawing development. *Journal of Aesthetic Education.* 22(1), 17-35.

Wood, D., Bruner, J. & Ross, S. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry, 17,*89-100

Wright, T. (1999). *The photography handbook.* London: Routledge.

Zebroski, J. T. (1994). *Thinking through theory: Vygotskian perspectives on teaching of writing.* Portsmouth, NH: Boynton/Cook.

I provide this list of web sites for those who are interested in reading more about visual research.

Several visual ethnography sites can be accessed from this link:
http://ether.asu.edu/peekaboo/VisualEthnography_links.html

This link takes you to a fairly comprehensive list of qualitative research web sites:
http://www.nova.edu/ssss/QR/web.html

Don Ratcliff's dissertation:
http://don.ratcliff.net/video/

Visual anthropology:
http://cc.joensuu.fi/sights/bm.htm

'sights' visual anthropology forum:
http://cc.joensuu.fi/sights/

A virtual library for visual anthropology:
http://vlib.anthrotech.com/bin/jump.cgi?ID=2582

Australian Centre for visual research:
http://www.anu.edu.au/culture/programs/vis-research.html

Marcus Banks site:
http://www.soc.surrey.ac.uk/sru/SRU11/SRU11.html

Katie Duffield's visual research methods:
http://www.spinworks.demon.co.uk/pub/visual.htm

Appendix

Ethical Considerations

The informed consent of all parents/guardians in the class was obtained before starting the study. The informed assent of the subjects was obtained. Both were given a clear explanation about the nature of the study and advised that they were free to withdraw from the study at any time without penalty.

The study took take place within the context of the ongoing activities of class. The focus was on the children's drawing in relation to their learning within the context of the Grade 1 curriculum.

The classroom space was large, the seating arrangements and work areas informal. The majority of learning occurred in small groups or individually. There was one teacher and a teaching assistant in the room at all times working with many differently combined groups. Had any child or family declined to participate at any time the group structure would easily have accommodated this. The children in this classroom were very familiar with the use of video and indeed used it themselves to record various aspects of their work and surroundings. They were also familiar with the process of reviewing their recordings, critiquing, and editing them for showing to other audiences.

While the anonymity of the subjects was protected at all times through the use of pseudonyms (when the child and family so desired this) the use of visual images in this study could in fact identify individual children. Both child and family had the opportunity to view any photos or video clips, and the context in which

they occurred, prior to inclusion in the thesis or viewing by an audience outside of the context of my thesis.

Here is a copy of the letter and release form which children and families received. It is followed by the ethics application.

Every child in this Grade 1 class, as well as their parents, agreed to participate fully in this study.

Dear Parents and children,

I am planning to begin the data collection for my Ph.D. study in February and will continue this to the end of the school year.

My study involves looking at how children use drawing as part of their learning. I would like to invite all the children in my Grade 1 class to participate in this study.

I hope to be able to provide for, and engage the children in, a wide variety of drawing activities. These activities will usually be integral parts of a larger topic or project we will study in relation to the grade one curriculum. The activities will be available to all children regardless of whether they are part of the study. The activities will be similar to the ones we are typically involved in during Project Work.

It is difficult to recall all the events of a project and review them in detail, so for this reason I propose to videotape small episodes of children involved in the drawing process. As you have observed, the children in this class usually work in small groups, or individually, on different aspects of a topic. This kind of grouping will allow me to easily accommodate those who might be included or framed in any recordings of the drawing process.

Each child also keeps a portfolio of work about the topic they have been studying. These portfolios typically contain a variety of drawings, which the child has undertaken in the context of coming to understand the topic being studied. They also contain photographic images and pieces of writing which describe the process of creating certain artefacts in relation to a topic. The children revisit their portfolios with me in order to select pieces for display, sharing with their peers and for parent presentations. Informal discussions with the children, either in groups or alone, about their drawing process occurs at this time. Artefacts from these portfolios and discussions will also be used as data for my research. Digital image capturing will allow me to capture and examine the artefacts without dismantling the child's portfolio.

In order to contextualise the artefacts and allow the child's voice to be heard I will also include, as data, their comments about their drawing alongside the relevant video clips. Rather than selecting specific children I will rather be looking for critical drawing incidents.

Children (and parents) will be free to choose not to participate in the study at any time without penalty.

I hope the children I work with will come to know the power that drawing can have in their learning. I hope my study will inform my own teaching and in some ways transform it.

I am available to answer any further questions you might have about this study.

Thank you.

Margaret Brooks

RELEASE FORM

With full consent I hereby authorise Margaret Brooks and the University of Alberta to make and reproduce video and still photography recordings of my minor child _____ and the artefacts they produce during the data collection period as outlined above.

I acknowledge that all such recordings are the sole property of the University of Alberta for its educational use and purposes.

In signing this form, I hereby release the University of Alberta, its representatives and all successors and assigns from any and all liability, demand or damage claims of every nature and kind arising out of or connected in any way with these recordings.

SUBJECT TITLE: Young children's drawing and learning.

LOCATION: Child Study Centre. DATE _____

PARENTS NAME (please print)_____

SIGNATURE _____

DATE _____

WITNESSED BY _____

CHILDS NAME (please print)_____

SIGNATURE _____

DATE _____

WITNESSED BY _____

Research Ethics Review Application

Applicant's Name: Margaret Brooks

Title: Drawing and Learning.

Purpose:

This study is part of a larger Ph.D. study on drawing. This component will look at the relationship between drawing and learning within the context of my grade one class. How the children in this class use drawing to better understand topics from the grade one curriculum. How these children solve problems with drawing and how they solve drawing problems.

Rationale:

Visual communication, or visual literacy, is increasingly becoming an important life skill. Much of the communication in our turn of the century world depends heavily on our ability to develop and decode symbolic and pictorial information. However visual communication is not yet well understood nor is it currently well supported in elementary education.

Methodology:

I have chosen the position of teacher researcher with my grade one class as the starting point of my study. I believe I am engaged in a pedagogical relationship with the children in my class. I will provide for, and engage them in, a wide range of drawing activities. These activities will usually be integral parts of the larger topic or project we study in relation to the grade one curriculum. The activities will be available to all children regardless of whether they are part of the study. The children typically work in small groups or individually on different

aspects of a topic. This kind of grouping will allow me to easily accommodate those who might be included or framed in any audio or visual recordings of the drawing process.

Each child keeps a portfolio of work about the topic they have been studying. These portfolios typically contain a variety of drawings, which the child has undertaken in the context of coming to understand the topic being studied. They also contain photographic images and pieces of writing which describe the process of creating certain artefacts in relation to a topic. The children revisit their portfolios with me in order to select pieces for display, sharing with their peers and for parent presentations. Informal discussions with the children, either in groups or alone, about their drawing process occurs at this time. Artefacts from these portfolios and discussions will be used as data for my research. Digital image capturing will allow me to capture and examine the artefacts without dismantling the child's portfolio.

In order to contextualise the artefacts and allow the child's voice to be heard I will also include, as data, video clips of them engaged in their drawing processes as well as stimulated recall responses to their viewing of their processes. The children involved will assist me with the editing process. Video is used on an ongoing basis by the children for other purposes and is a familiar medium to them.

Rather than selecting specific children I will begin by looking for critical incidents.

How the data will be used:

The data will be used to make inferences about how children use drawing in their learning.

This data will become part of my Ph.D. thesis.

The same data may also be used in articles or presentations for educational purposes.

Guideline 1: What is the degree of risk to study participants?

Minimal deception or risk to the students involved in the project.

It is relatively easy, because of the size of the room, the small groups and style of teaching, to unobtrusively frame those who wish to be part of the study.

There will be no direct benefits or disadvantages to students who choose to participate in the study.

Similarly students not participating will neither benefit nor be disadvantaged.

Guideline 2: Consent issues.

A letter of consent addressed to students and parents will outline the nature of the research and expectations of those willing to participate in the study (see attached). A consent form is to be returned stating either participation or non-participation in the study. This consent form requires both the parents and the child's signatures. Within this letter students and parents are informed that they may withdraw from the study at any time and that the student may choose not be videotaped on any time. Upon reviewing the videotape children and families may also request that specific information be included or not included.

Permission to conduct this study has also been granted by the Director of the Centre.

Guideline 3: Informing students and anonymity

A letter and a consent form will be given to the child and their parents clearly stating the purpose of the study, their rights, and the research activities.

Any public reproduction of the child's work will be identified with a pseudonym.

Visual images of children, whose parents have consented to their participation in the study and who give their assent, will appear in the study.

Written permission will be obtained from the parent prior to this material being used for public exhibition.

Guideline 4: Familiarity with ethical guidelines

This project conforms to ethical guidelines regarding risk and benefits, consent, anonymity and confidentiality.

Guideline 5: Competence of individuals

Throughout the course of the study I will be meeting with the course professors on a regular basis to review all aspects of the research including ethical guidelines.